ANNALS OF MEDICAL HISTORY

PUBLISHED BIMONTHLY

New Series, Vol. V, No. 4 JULY, 1933 Whole No. 68

EDITOR

FRANCIS R. PACKARD, M.D., Philadelphia, Pa.

ASSOCIATE EDITORS

LE ROY CRUMMER, M.D.	Los Angeles
HARVEY CUSHING, M.D.	Boston
IRVING S. CUTTER, M.D.	Chicago
CHARLES L. DANA, M.D.	New York
GEORGE DOCK, M.D.	Pasadena
FIELDING H. GARRISON, M.D.	Baltimore
HENRY BARTON JACOBS, M.D	Baltimore
HOWARD A. KELLY, M.D.	Baltimore
ARNOLD C. KLEBS, M.D.	Nyon
SAMUEL W. LAMBERT, M.D.	New York
THOMAS McCRAE, M.D.	Philadelphia
LEWIS STEPHEN PILCHER, M.D.	Brooklyn
SIR D'ARCY POWER, K.B.E., F.R.C.S.(ENG.), F.S.A.	London
DAVID RIESMAN, M.D.	Philadelphia
SIR HUMPHRY ROLLESTON, BART., G.C.V.O., M.D.	London
JOHN RUHRÄH, M.D.	Baltimore
CHARLES SINGER, M.D.	London
EDWARD C. STREETER, M.D.	Boston
WILLIAM H. WELCH, M.D.	Baltimore
CASEY A. WOOD, M.D.	Chicago

NEW YORK,
PAUL B. HOEBER, INC., PUBLISHERS
SEVENTY-SIX FIFTH AVENUE

ANNALS OF MEDICAL HISTORY

NEW SERIES, VOL. V, NO. 4 JULY, 1933 WHOLE NO. 68

CONTENTS

PAGE

PORTRAIT OF PIERRE JOSEPH DESAULT . . . . Cover

PORTRAIT OF THEODORE TURQUET DE MAYERNE . . . . Frontispiece

A SKETCH OF THE CAREER OF THEODORE TURQUET DE MAYERNE . . . . . . THOMAS GIBSON . . . 315

THE "DE OVORUM GALLINACEORUM GENERATIONIS PRIMO EXORDIO" OF VOLCHER COITER (PART I) . . . . HOWARD B. ADELMANN 327

PIERRE JOSEPH DESAULT . . . . B. BARKER BEESON . 342

THE HISTORY OF PURPURA HEMORRHAGICA . HAROLD W. JONES AND LEANDRO M. TOCANTINS 349

GOETHE AND HIS THEORY OF COLORS . . BURTON CHANCE . . . 360

WILLARD PARKER (PART II) . . . . . . JOHN RUHRÄH . . . 376

AN INTRODUCTION TO THE HISTORY OF WOMEN IN MEDICINE (PART II, CONTINUED) . KATE C. HURD-MEAD . 390

EDITORIAL 406

NINTH ANNUAL MEETING OF THE AMERICAN ASSOCIATION OF THE HISTORY OF MEDICINE

BOOK REVIEWS 407

HOWELL: MEDICINE IN CANADA; HETT: THE MEMOIRS OF SIR ROBERT SIBBALD; DILLER: DIE UBERLIEFERUNG DER HIPPOKRATISCHEN SCHRIFT ΠΕΡΙ ΑΕΡΩΝ ΥΔΑΤΩΝΤΟΠΩΝ.

Original articles are published only with the understanding that they are contributed exclusively to the ANNALS OF MEDICAL HISTORY. Manuscripts offered for publication, books for review, and all correspondence relating to the editorial management should be addressed to the Editor, Dr. FRANCIS R. PACKARD, 302 South 19th Street, Philadelphia, Pa.

Communications regarding subscriptions, reprints, and all matters regarding the business management of the ANNALS OF MEDICAL HISTORY should be addressed to the publishers, PAUL B. HOEBER, INC. 76 Fifth Avenue, New York City. [Cable address, Formed N. Y.]

The ANNALS OF MEDICAL HISTORY is published six times a year, the six issues comprising one volume. No advertising is carried. The subscription price is $10.00 a year, foreign $11.00. Current single numbers $2.50 per copy. A few sets of first series, Volumes I–X, are available in parts as published at $100.00 per set. or bound in boards, paper sides, canvas back, paper label, $135.00 per set. Price on available single volumes or numbers will be quoted on request.

Entered as second-class matter, June 2, 1917, at the Post Office, New York, N. Y., under the Act of March 3, 1879

Copyright, 1933, by Paul B. Hoeber, Inc.

Frontispiece
Annals of Medical History
July, 1933

THEODORE TURQUET DE MAYERNE
[1573-1655]

[From Schenckius: Observationum Medicarum, Francofurti, 1609.]

ANNALS OF MEDICAL HISTORY

NEW SERIES, VOLUME V JULY, 1933 NUMBER 4

A SKETCH OF THE CAREER OF

THEODORE TURQUET DE MAYERNE

PHYSICIAN TO FOUR KINGS, SPAGYRIC THERAPEUTIST, AND PIONEER IN THE COMPILATION OF ELABORATE RECORDS OF CLINICAL CASES

By THOMAS GIBSON, M.B., C.M. (Edin.), F.R.C.P. (Can.)

KINGSTON, ONT.

THEODORE TURQUET DE MAYERNE was born at Mayerne, not far from Geneva, in the year 1573. His father was Louis Turquet de Mayerne, a Protestant of Piedmontese descent, and his mother was Louis le Maçon, daughter of Antoine, Treasurer-at-war to Francis I and Henri II of France. Louis is remembered as the writer of a history of Spain. Their son was named after Theodore Beza, the friend of Calvin. Among the Sloane manuscripts in the British Museum (No. 2013) there is a notebook of Theodore's when a school-boy of twelve years of age, containing miscellaneous jottings of his studies. One of these notes is on logic, another on processes of distillation with drawings of various stills well executed, and finally comes a copy of a French pastoral play. These reveal a variety of interests, and the second points to one of the ruling passions of his long life-concern to understand the precious things found in, or springing out of the earth, so as to employ them for the use of man. After his Geneva schooldays, he spent four years at Heidelberg, and then betook himself to Montpellier to study medicine, graduating M.B. in 1596, and M.D. in 1597.

Young Mayerne lost no time in putting his fortune to the proof in Paris, where Lazarus Riverius, Professor of Medicine at Montpellier, was one of the physicians attached to the court of Henri IV. No doubt aided by his former chief's influence, Mayerne was soon appointed teacher of anatomy to the surgeons, and of pharmacy to the apothecaries, and in 1600 he became a district physician of Paris, by royal warrant, and was elected one of the physicians-in-ordinary to the King.

Before long Mayerne's clinical use of metals and their salts drew the fire of the orthodox Galenists of the Paris faculty, one of whom published, in the year 1603, a book entitled "Apologia pro medicina Hippocratis et Galeni, contra Mayernium et Quercetanum." Mayerne replied to this in a tract of 120 pages, defending the teaching of his old school at Montpellier, and maintaining that his own practice was that of a reverent follower of the great founders of medical tradition. This rejoinder, though moderate and dignified in tone, still further annoyed the orthodox, and an abusive anonymous pamphlet, traditionally traced to the elder Riolan, and entitled "Ad famosam Turqueti apologiam responsio," brought to an end the wordy war. The Paris Faculty took action to the extent of condemning Mayerne's "Apologia," forbidding his colleagues to consult with him, and advising that he should be deprived of his public offices.

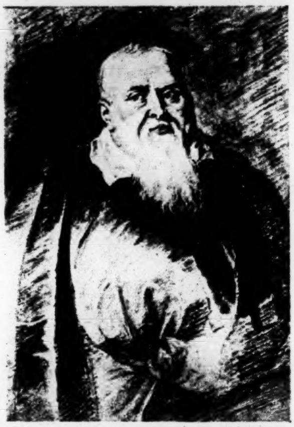


Fig. 1. Theodore de Mayerne, by Rubens. Original in the British Museum.

Far from being influenced by these attacks, the King honored him by sending him on important missions to German and Italian courts, in the discharge of which his discretion and dignified bearing still further enhanced his reputation.

Early in 1606 one of those events, trivial in themselves, came about, which often change the current of a human life. An Englishman attached to the court of James I arrived in Paris on a visit to the French king. Falling ill, he was restored to health under Mayerne's care. The personality of the French physician made such an impression upon him as to lead him to urge Mayerne to visit London. The invitation was accepted, and resulted for the visitor in a veritable triumph. Not only did the profession welcome him and the University of Oxford incorporate him on the strength of his Montpellier degree, but James appointed him one of the Queen's physicians, among whom there was already another Huguenot Frenchman, Peter Chamberlen, senior, reputed inventor of the obstetric forceps. Mayerne, however, decided to return to his service at the French court, where he remained until the assassination of Henri on May 14, 1610. Soon after, James sent an escort to conduct Mayerne to London, where the remainder of his busy career was spent.

James appointed him forthwith chief physician to himself and his household, so that at one step he took the premier post in the medical profession of Britain. His colleagues received him, upon the whole, in a most friendly spirit, though there were the usual grumblings from the less favored at his rapid preferment. "Much envy," writes John Chamberlen to Sir Dudley Carleton August 11, 1621, "was caused by Turquet's preferment, who hath four hundred pounds from the King, four hundred from the Queen, with a house provided for him, and many other commodities which he reckons at fourteen hundred pounds a year." The house which he occupied until the death of the Royal Martyr was in St. Martin's Lane: thereafter he lived at the village of Chelsea.

That charming person, Dorothy Osborne, gives us a pretty glimpse into the family life of the Mayernes at Chelsea in the thirtieth of her letters to her betrothed, William Temple. Temple had written to tell her of the death of her old playmate Elizabeth Mayerne. Elizabeth's first betrothed, Lord Hastings,* died on the eve of their marriage, and some time after she had married a Huguenot of distinguished family, Pierre de Caumont, Marquis de Cugnac.

> What a sad story you tell me of the little Marquise. Poor woman, yet she is happy, she is dead, for sure her life could not be very pleasing to her. When we were both girls I had great acquaintance there, they lived in Chelsea by us, and as long as his son lived, Sir Theodore did me the honour to call me daughter. But whilst I was first in France, he died, and with him my converse with the family, for though my mother had often occasion to be there yet I went but seldom with her, they were still so passionate for their son that I never failed of setting them all a crying, and then I was no company for them. But this poor lady had a greater loss of my Lord Hastings, who died just when they should have been married, and sure she could not think she had recovered it all by marrying this buffle-headed Marquis. And yet one knows not neither what she might think. I remember I saw her with him in the park a little while after they were married, and she kissed him the kindliest that could be in the midst of all the company. I shall never wish to see a worse sight than it was, nor to be anything longer than I am your faithful D.O.

William Temple's mother was a sister of that Dr. John Hammond who first attended Prince Henry Frederick of Wales during the onset of his fatal illness, at Richmond on Thames in the autumn of 1612. In the account lists of His Royal Highness' household, we find John Hammond's name as in receipt of one hundred and forty pounds per annum. He also received forty pounds a year from the King.

Mayerne was made a fellow of the Royal College of Physicians in 1616. He and a French Huguenot chemist had much to do with the preparation of the first London Pharmacopoeia, the dedication of which to James was written by Mayerne. The book was published in 1618.

From the year 1621 Mayerne's name is sometimes accompanied by the title Baro Albonae, Baron of

---

* Henry, Lord Hastings, died of smallpox at the age of nineteen. Like Henry, Prince of Wales, he was one of the most gifted youths of his time. His death was sadly commemorated in a volume of thirty-three elegies by many hands, entitled "Lachrymae musarum." Dryden, then in his eighteenth year, had been his schoolmate at Westminster School, and his first published poem was one of these elegies. It contains many fantastic conceits, of which the following is an example:

Heaven would no longer trust its pledge, but thus
Recalled it, rapt its Ganymede from us.
Was there no milder way but the small-pox?
So many spots, like naeves, our Venus soil?
One jewel set off with so many a foil?
Blisters with pride swelled, which through his flesh
  did sprout
Like rose-buds, stuck in the lily-skin about.
Each little pimple had a tear in it,
To wail the fault its rising did commit;
Which, rebel-like, with its own lord at strife,
Thus made insurrection 'gainst his life.
Or were these gems sent to adorn his skin,
The cabinet of a richer soul within?
No comet need foretell his change drew on,
Whose corps might seem a constellation.

For this reference, the writer is indebted to his friend, Professor Frederick Tupper, of the University of Vermont, Burlington. Mayerne attended his prospective son-in-law in his last illness.

Aubonne. About that time he had purchased some property near Lausanne at Aubonne, the ancient name of which had been Alba Bona, or Aula Bona, of which words Aubonne was a corruption. The title was a courtesy one not recognised in England. James dubbed him knight, *eques auratus*, in 1624. He was one of those who attended the King during his last illness in March 1625, the cause of death being a tertian ague in a gouty man with chronic nephritis.

Charles I retained Mayerne as chief physician, but his usual health called for little attention. The intimate terms upon which he stood with his royal patients is evident from their letters to him, some of which Mayerne copied into his case-books. In one of these Charles writes: "Mayerne, pour l'amour de Dieu, allez trouver ma femme." In another the Queen signs herself "votre bien bonne maitresse et amie."

In July, 1641, as we learn from the memoirs of the Verney family, Mayerne was called upon by a committee of the Commons to furnish a report upon the Queen's health, especially as to whether it was necessary that she should go to the Continent for treatment at Spa. She had complained that her health had been "much impaired by some discontents of mind and false rumours and libels spread concerning her." She also desired to take with her her daughter Mary to visit her betrothed, Prince William of Orange. Her enemies suspected her of a design to take large sums of money out of the country to pay for the services of French troops in England for the support of the King's party. The committee had cautiously suggested that the Spa water could be used in London with more economy and less danger to the State. Mayerne, with his usual adroitness, gave the following opinion:

> Spaw water is not fit for her at present, her body not being prepared. Any change of air would do her good, be it what it will. She hath a great opinion of the Spaw water. Waters have twice done her good. Spaw water is better than the best waters in England. To cure her body her mind must be quieted. The Queen is sick in body and in mind, and thinks she cannot recover, let her be out of reach of employments that may disturb her. She believes she is very ill. Unless remedies be used she cannot live, and the waters must be taken between this [July 14th] and the middle of August.[1]

Henrietta Maria had doubtless cause enough to be in a neurasthenic state of body and mind in those dangerous days before the outbreak of the civil war.

It is believed that the great Oliver was seen in consultation by Mayerne, shall we say with our English Hippocrates, Cromwell's usual physician? On the accession of Charles II Mayerne was confirmed in his office as nominal chief physician, but nothing is known of any services rendered to that sovereign.

Mayerne died full of years and honors at his house in Chelsea, on March 22, 1655, leaving a very large sum of money behind him. There is a casual confirmation of the popular rumor as to Mayerne's wealth in a letter of Mary Verney's to her husband, Sir Ralph Verney, April 1, 1647: "Dr. Mayerne lives near in to me. He hath but one daughter who, they say, is the greatest marriage in England." The Verney Papers[2] report the following fragment of a letter written by Dr. Denton, physician to Charles II: "Dr. Mayerne is buried and died worth £140,000." In passing, one may remark that the same Dr. Denton wrote a book of political polemics entitled "Horae Subsecivae." It would be interesting to know whether that much beloved writer, Dr. John Brown, had come across this title as used by the old royalist doctor when he chose it for the baptism of his own so different, and so charming, collection of stories and appreciations.

Sir Theodore was buried in St. Martins-in-the-Fields, the older edifice which then occupied the site of the beautiful Gibbs church on the Northwest corner of Trafalgar Square. As was the custom of the time, there was inscribed upon his tomb a profuse and high-sounding Latin eulogium, composed by his godson, Sir Theodore des Vaux. This may be rendered somewhat freely into English as follows:

> Reader, mayest thou always be in health to venerate the memorial of him whose skill preserved the lives of such a multitude.
>
> He whose dust is hidden within this marble, was once that great man Theodore Mayerne, *magnum nomen*, second Hippocrates, health-bringer to the world, ornament of his age, the shamer of his opponents, and exemplar to his successors. To incomparable skill in the art of medicine and profound knowledge of nature's secrets he added marvelous acquaintance with the affairs of politics, prudence, fertility in expedients, nimbleness of mind to the height of miracle; his spoken addresses had purity and charm of diction, and his opinions expressed in consultation had the concise brilliance of gems; moreover there was evident in his conversation a steadfast and reasoned profession of natural piety.
>
> There was none in the presence of Kings happier in the ingenuous freedom of converse, nor more a favourite with the court on account of his worth, nor anyone more ready to offer countenance to those of lower rank; among persons of all sorts and during a period full of unrest, he was ever the same, and like himself, wise, politic, firm, undismayed, so that it appeared as if both events and men, yea even fortune herself were swayed by his genius.
>
> What more shall I say of Mayerne? When you have said "Mayerne," you shall have said all.
>
> His soul is escaped to heaven, his bones are committed to this tomb and his immortal memory rests with fame.
>
> Reader, be happy and fare thee well! I who by my skill often turned back upon death his own darts, compelling very poisons to the cure of disease, even in dying I practise a similar art through Christ; what is death to others, is healing for me.

Mayerne was twice married, and had seven children, but he outlived them all, and left no descendants of the third generation. The poor little Marquise, Dorothy's friend, died in childbed at the Hague in 1653. Family afflictions indeed appear to have been almost the only serious troubles which Mayerne encountered. He seems to have carried full sail throughout his long life. We might liken him, in this respect, to Dr. Richard Mead, who, as Dr. Samuel Johnson said, "lived more in the full sunshine of life than any man." Rich in gifts of head and heart, with varied talents assiduously improved, he seems to have been completely ready for any of the multifarious duties and responsibilities placed upon him, a royal physician living in two of the most cultivated nations of the period, and during times of the greatest political peril to his royal masters. Considering facts like these, we must admit that the lapidary inscription was not, after all, overdone.

Sir Wilmot Herringham, in his Harveian Oration of St. Luke's day, 1929, pointed out that on May 19, 1645, about one month before the battle of Naseby, which proved the decisive encounter of the civil war:

> He was paid the greatest compliment that Parliament has ever, I suppose, paid to a medical man. The Lords sent down a message to the Commons:—"The Lords desire that the house of Commons would join with them in expressing their esteem of a man whose extraordinary abilities would make him welcome in any part of Christendom; and as he is singular for his knowledge in his profession, so he may be singular in being by the favour of the House exempted from all payments which others are subject unto: it being but a continuation of that favour which he hath enjoyed for about thirty years without interruption." The House of Commons agreed by sixty-nine to sixty-six.

Thirty-five years after Mayerne's death, a committee of the College compiled a "Praxis Medica" by collating, under headings of the acute diseases, his treatment of these as exemplified in the immense series of case records found after his death. This furnishes, perhaps, the most cogent proof of the immense authority which the leaders in the profession still attached to the Mayernian tradition. His library he bequeathed to the College, and it was consumed in the great fire of London. Fortunately for the history of British medical practice in the seventeenth century, these case-records escaped.

The "Praxis" must have been well thought of, because in the next year, 1691, an edition was printed by a firm of booksellers in Augsburg, with the valuable addition of Mayerne's tract upon the treatment of pregnant women, which someone had found among the manuscripts in the library of Jerome Welschius of Augsburg. There are here three reports of methods used in some obstetric emergencies by Peter Chamberlen senior, who, as has been said, was one of the large group of physicians attached to the household of James I.

There are twenty-three volumes of Mayerne's case-records in the British Museum among the Sloane collections: the Royal College has another group, the last addition to which was bequeathed to it by the late Sir William Osler. The story of how he came to possess these papers will be found in his Life by Harvey Cushing. Very few are in Mayerne's handwriting, many are signed by him. He employed at least two amanuenses, both of whom were careless or but indifferent scholars. French and Latin are used almost exclusively, and the style is impure in both languages and full of mistakes in spelling and syntax. The largest collection of these in print was made by Dr. Joseph Browne and published in 1700 or 1701, for the date varies in some of the volumes. Browne's "Opera Omnia" contains a large Mayernian Pharmacopoeia, no doubt his own private collection of useful formulae, most of them not of his own invention. To a few he lays that claim. There is a special collection of the formulae which Mayerne had prescribed for the Queens among his patients. Many of these are concerned with the toilet—and the preservation of good looks. Some of his formulae are as simple as one could wish, but the great majority are of bewildering complexity, and must have been very costly to compound. Plentiful remains of the nastiness of ancient pharmacy, and some of its superstitions are scattered here and there.

Dr. Donald Monro, in his Harveian Oration of October 18, 1775, gave Mayerne credit for the discovery of calomel. Pereira, however, in his Materia Medica tells us that Beguin, in 1608, and Oswald Croll, in 1609, were the first in Europe to mention this compound of mercury, and that its discoverer is unknown. He assigns to Mayerne, however, the first use of the name calomel for the mild chloride of mercury. Mayerne claims discovery of his mercurial water, our lotio nigra, and of a clyssus metallorum which contained mercury and antimony. One of his formulae for the water was as follows: Recipe, Aquae calcis ℥vj, Mellis rosatae ʒij, Mercurii dulcis ʒj—Misce. He writes to his old friend, Lord Francis Conway, under date of September 19, 1648, as follows:

> . . . I send you a bottle of my mercurial water. It is not to be drunk, but is only for bathing the parts which chafe and are irritated. Temper it well with rose water and plantain, that it be not too strong and burn the skin. So diluted, it will, I hope, have good effect. Let me know of its success.

The freedom with which he gave mercury internally may be judged by the following advices. For robust patients, such as rustics, smitten with venereal infection, he gave 10 grains of calomel with jalap, senna, and guaiacum. For repeated use in syphilis he advised a bolus compounded of mercury ʒvi, ℈ij, Venice turpentine ℈iv, with eleven sheets of gold leaf. This was to be divided into twenty pill masses, involving a dose of 20 grains of mercury in each dose. If these doses are correctly reported, there was some ground for the strictures of the Paris Faculty against the chemical physicians.

Except where the disease carried with it opprobrium, the name of each patient and the general diagnostic appellation heads each case-record. So one after another of the nobility and gentry of seventeenth century France, England and Scotland pass before the eye of our imagination as the patients of the great physician of the time. One of the first Mayerne attended after settling in London was Robert Cecil, Elizabeth's chancellor, then an old man dying of a malignant abdominal growth.

The most brilliant and charming figure among them all is that of Henry Frederick, Prince of Wales, "the darling of England" as he was fondly named. Sabatini, in his recent story of the period, entitled "The King's Minion" (Robert Car, Earl of Somerset) thus sums up the personality of this "well-beloved youth," from the contemporary records:

> Although still in his seventeenth year, he was of good height and excellently well shaped, as graceful in body as in mind, and in all things the very antithesis of his sire. High spirited, valiant, gracious, and even at this young age a patron of all deserving arts, he was fast becoming the idol of the people, whilst the very flower of the nobility was found surrounding him at St. James' Palace, where he held his court. Athletic in his pursuits and austere in manners, God-fearing and studious by inclination, he contrived to be dignified and princely beyond his years.

The summer of 1612 was hot and dry beyond living memory and the Prince, after strenuous exercise followed by a heavy dinner, would spend hours in the shrunken waters of the Thames cooling off. He had a great liking for oysters, both raw and cooked. Mayerne tells us these things in his preliminary account of his patient's life and health history. The oysters no doubt came from the Thames estuary, and were well infected in a low water year.

Dr. Norman Moore[3] first pointed out that here we have the original well-observed and described clinical case of typhoid fever, in English at least. Cases like it were common that autumn in England, and were generally looked on at first as irregular tertians, until they became continuous. They called it "the new disease" colloquially. Mayerne's account in French was in part an apologia to meet the wild rumors that flew fast during the Prince's illness, and still more wildly after his death. He himself was thought by some to have poisoned the patient. At the post-mortem, the stomach was opened chiefly to prove that it showed no sign of the effects of such a poison as corrosive sublimate, one of the commonest implements of the contemporary poisoner, as in the case of Sir Thomas Overbury. The intestines were not opened, so that we read nothing about the lesions of the disease there. The treatment used by Mayerne and his associates was, for those times, quite moderate. Mild purgative pills, laxative clysters, cordials and cooling drinks, two moderate bleedings, one early and the lesser one late in the case were used, while bezoar stone and sundry alexipharmics were thrown in to satisfy orthodox tradition. Foolish things were done towards the end, in desperation, like the application of split live pigeons to the head and back of the neck. Through it all, the young Prince behaved with his usual manly dignity, and composed himself for the inevitable end while yet mental clearness lasted. One can feel Mayerne's affectionate concern, especially in his private notes of the case in Latin. In it appear some intimate touches left out of the more official account. He tells us that one afternoon, before leaving St. James to take some rest, he was given a snack to eat (*jusculum*), probably by some sympathetic butler. His account of the fatal omen of the lunar rainbow which appeared, one limb over-arching St. James and the other off in the fields, about ten nights before Henry's death, is omitted from the French version also.* A certificate from the King accompanies the account of the illness and post-mortem, expressing complete satisfaction with everything that had been done by the physicians.

To take just one example of less worthy therapeutic notions, we choose the case of the twelve-year-old son of Lord Monteagle, reported on January 22, 1612. Lord Monteagle was one of those deputed to search the cellars of the Houses of Parliament, where they found Guy Fawkes watching the thirty-seven barrels of gunpowder, insufficiently concealed under straw and faggots of wood. The superstitious ideas still obscuring the minds of the profession in regard to epilepsy perhaps explain why the treatment suggested by Mayerne falls so much below his normal average. Three specifics are offered. (a) The dung of a white peacock one drachm infused in four ounces of white wine overnight: in the morning it is to be strained and some aromatic added to it. This is to be given four times before the full moon, so that the last dose is to be taken on the very day of the full moon, four hours before dinner, the patient using walking exercise until free perspiration takes place. (b) Let a living mole be split down the middle and the viscera, wrapped up in moist tow, be dried in hot ashes and then pulverised. Give the powder in white wine at first warning of an attack. (c) Take valerian root collected before the leaves have appeared, let it be dried in the dark and pulverised. Of this from a half to one drachm may be given daily in the morning. If worms should be found after the use of any of these medicines, give boldly such things as twelve grains of calomel, etc.

---

* The same phenomenon was observed by others. In the Somers Tracts, ed. 2, by Sir Walter Scott (1809, 2: 237) we find the following: "This evening there appeared a very fatal sign, about two hours or more within the night, bearing the colours and shew of a rainbow, which hung directly cross and over St. James' house. It was first perceived about seven o'clock at night, continuing till bedtime." The date is October 29, 1612. The Prince died about eight o'clock on the evening of Wednesday November 6, 1612.

It seems strange that therapeutic notions like the first two could persist right up to the time when Harvey was conducting his great experiments. No wonder that Bacon, in his "Advancement of Learning" (1605), complained that hitherto medicine had been "more laboured than advanced." Mayerne must surely have been acquainted with the preface to the "De Magnete" of William Gilbert (1603), which sounded the Baconian challenge even earlier. One wonders whether he may have thought that by his elaborate records of the natural history of many instances of diseased states he might be doing something, at least the thing that seemed given to his genius to do, to enlarge the scope of medical observation and the knowledge of clinical facts.

One of the interesting items wisely preserved by Joseph Browne is a Latin letter of Mayerne's to William Harvey. Harvey was at Newmarket with the Court and had written to his friend to ask his advice concerning an obscure fever from which the Prince Palatine was suffering. Mayerne's reply is dated February 3, 1636. He expresses his experienced sympathy as a fellow-regius physician, and continues:

> It is the genius of all Princes that whatsoever they desire they dare, even at peril of safety, so that their physicians ought truly to be judged unhappy men, called as they are to play the part of Cassandra. Whatever, on the theatre of the Court, they may advise by way of caution, or predict from dangerous premisses, they are either not listened to, or laughed at, at least, as of no account. In the long run, however, the mighty must pay the price of spurning good counsels . . . Truly I am kept busy daily, while in the practice of my profession beyond the limits of the Court, in making proof of my expertness without other medical witnesses, even though they might be my advocates. But I never advance to the attack upon the diseases of Royalty without a crowd of Asclepiadae fighting wholeheartedly by my side . . . May good fortune attend you in your weighty task. I bid you farewell who am your most loving Mayerne.

Between the years 1620 and 1646 Mayerne paid a great deal of attention to the chemistry of pigments. There is a volume of his researches in this field among the Sloane collections.[4] These bore useful fruit when his Genevan compatriot, Jean Petitot, arrived in London, after a period of artistic service at the French Court. Like our own Raeburn, he began his career as a goldsmith and then took to the art of the miniaturist. Good authorities place him in the very front rank as an exponent of this most delicate and fascinating art. Anton van Dyke supervised Petitot's renderings of some of his own finest portraits, and became his most influential patron.

Horace Walpole, in his "Anecdotes of Painting,"[5] tells us that it was Mayerne who introduced Petitot to Charles I, and that he "communicated to him the process of the principal colours which ought to be employed in enamel, and which surpass the famous vitrifications of Venice and Limoges." In particular Mayerne provided Petitot with a new purple pigment which enabled him to produce a soft carnation tint for flesh coloring.

That curious and credulous dabbler, Sir Kenelm Digby, in his "A Late Discourse touching the Cure of Wounds by the Powder of Sympathy," tells us how Mayerne came to find out that the magic powder was nothing but green vitriol ($FeSO_4$). Digby had given some to the King, at James' own request, and Mayerne had seen the King dissolving it in water with which to bathe the weapon which had inflicted the wound, or some garment or bandage stained with the patient's blood. The performance of this simple ritual was the means by which immediate relief of the pain and rapid cure of the wound was supposed to be brought about. Digby had first used the method upon James Howell of the "Letters," who had been severely wounded while trying to separate two of his friends whom he found fighting a duel.

The following is from Digby's account of Mayerne's discovery:

> Doctor Mayerne, his first Physician watched to discover what was done by this secret, and at last came to know that the King made use of Vitriol. Afterwards he accosted me, saying, he durst not demand of me my secret, because I made some difficulty to discover it to the King himself. But having learnt with which matter it was to be done, he hoped that I would communicate unto him all the circumstances how it is to be used; I answered him, That if he had asked me before, I would have frankly told him all, for in his hands there was no feare that such a secret should be prostituted, and so I told him all. A little after the Doctor went to France, to see some fair Territories that he had purchased near Geneva, which was the Barony of Aubonne. In this voyage he went to see the Duke of Mayerne, who had been a long time his friend and protector, and he taught him his secret, whereof the Duke made many Experiments, which if any other but a Prince had done, it may be they had passed for affects of Magick and Enchantments.

The following extracts from letters to one of his friends, Sir Francis Conway, when they were both well stricken in years and common experiences of life, will illustrate Mayerne's temper and cheerful spirit in social relationships. October 8, 1651:

> Too often, in this matter of books, "parturiunt montes, nascitur ridiculus mus."[6] It is a powerful disease, this writing, by which, especially in Germany, most of the world is afflicted, and what is more, "scribimus indocti doctique poemata passim."[7]
>
> I had seen the receipt you sent for making fat men lean, which is not bad and can be taken without danger, though rather with cummin and vinegar than salt. But I assure you that I shall never use it, having been long aware that an evil soul never, or rarely, dwells in a fat body. There is nothing new to me in seeing sulphur taken internally to cure a red face and eruptions on the body. I myself use it every day with success. You will oblige me greatly if you will send me "L'Escole de Salerne,"[8] a burlesque in verse by that Ovid of nice wit. I have already seen it, and if I feared death, should be afraid of putting myself again into that burlesque humour, but I am dissuaded by the colour of my beard. The

shortest follies are the best, but for "L'Escole de Salerne," that is quite in my style. Remember me always with affection, my Lord, your very humble and very obedient servant, Theo. Mayerne.

October 17, 1651:

What use have bread when one has no teeth, and music when the ears are deaf to the sound of a trumpet? Time, when it is past is irrevocable; if there is any joy for an old sinner it must be sought in memory —which is too often full of repentance to the wise, and regret to the spiritless, among whose number I have never been. Let us seize all the best we can and leave the rest to the good God. Thus shall we live until we die in spite of physicians. . . . Be merry, my Lord, first of all from natural inclination, and then upon the order of him, once your physician, and always your very humble servant, Theo. Mayerne.

It is as an acute observer of the symptoms and physical signs of disease, so far as these might be traced by unaided human senses, and as a tireless and most voluminous recorder and critic of such evidence that Theodore Turquet de Mayerne is to be praised among seventeenth century physicians. Dr. Norman Moore, in his "Medicine in the British Isles," reminds us that the first original description in Britain of a new disease observed in his own time is to be found in the "De ephemera Brittanica" of John Caius, London, 1555. The book, however, contains no series of clinical observations after the Hippocratic model, but only "a general account of the epidemic, of its prognosis and of the treatment adopted." Caius was then living and working at St. Bartholomew's Hospital. He offers no discussion of morbid anatomy in order to explain observed symptoms, but gives large room to theories "on the general scheme of fevers and on its origins." The proper, inevitable relation between morbid anatomy and clinical medicine had not yet been realized. There are definite traces of pathological observations in some of Harvey's notes, for example in his account of a case of suppurative hydatid of the liver, and in the writings of William Clowes, surgeon, in Elizabeth's time (Norman Moore). The bulk of Harvey's clinical notes has, unfortunately, been lost.

Ambroise Paré has left us charmingly human accounts of many of his cases, but, being a surgeon, he has more to say of the operative and other common sense measures used in their wise treatment. Sydenham is more the master of brilliant general accounts of disease types. Thomas Willis sketches in many interesting cases in illustration of his general descriptive medicine. One of these tells of the sufferings for so many years of that remarkable woman, Anne Finch Conway, the friend and compeer of the scholars of her time. Harvey was her family physician, but she had suffered many things at the hands of many others. One of the last who tried to charm away her agonizing headaches was Greatrakes, the Irish "stroaker," a simple-minded but sincerely religious man who had felt a call to cure folks by the laying on of hands, and seems to have had the gift of a soothing massage touch. All that, however, is quite another story.

To Mayerne, therefore, must be given the credit of founding the practice and method of careful case taking, and case recording. In Prince Henry's case, every day has its separate short history, with notes of the consultations and opinions of one or other of the consultants. This, however, is the exception. In the others, Mayerne is thinking aloud about it all, history from childhood, previous illnesses, their treatment and issue, onset of the present attack, course up to date, discussion of causation, prognosis, and, in most elaborate fashion, tabulation of general measures, dietary, etc., winding up with the drug therapy illustrated by series of the most elaborate formulae. Ponderous, otiose even, but intensely sincere, and the work of a most devoted and keen-minded physician. Truly, in his time he played many parts, but the great rôle was that of healer and friend of mankind. Peace and honor to his memory.

> . . . wonning in these ancient lands,
> Enchased and lettered as a tomb,
> And scored with prints of perished hands,
> And chronicled with dates of doom,
> Though my own Being bear no bloom
> I trace the lives such scenes enshrine,
> Give past exemplars present room,
> And their experience count as mine.
>
> Thomas Hardy.

References

1. Verney Papers. ed. 1894, vol. 2, p. 23.
2. Vol. 3, p. 195.
3. *St. Bartholomew Hosp. Rep.*, vol. 17, 1881.
4. Sloane Ms. No. 2052.
5. Vol. 3 of his Collected Works.
6. Horace, Ars Poetica, I, 139.
7. Horace, Epistolae, II, I, 117.
8. Dr. W. W. Francis believes that the book referred to was a burlesque of the "Via Salernitana," with macaronie of Farengo and Remi Belleau, published by Louis Martin.

THE "DE OVORUM GALLINACEORUM GENERATIONIS PRIMO EXORDIO PROGRESSUQUE, ET PULLI GALLINACEI CREATIONIS ORDINE" OF VOLCHER COITER

TRANSLATED AND EDITED WITH NOTES AND INTRODUCTION BY

HOWARD B. ADELMANN, PH.D.

ITHACA, N. Y.

PART I

INTRODUCTION

IN its cardinal features the developmental pattern of all vertebrate embryos is strikingly uniform. Wide variation in detail, often apparently adaptative, may, to be sure, be observed in individual forms; but in spite of this fact, development follows fundamentally the same pattern throughout the series. A thorough acquaintance with the ontogeny of almost any vertebrate will, consequently, serve as a basis for understanding the more general features of development of others.

Upon this fact modern practise in the teaching of embryology rests. The development of one or more type forms is studied carefully as a basis for comprehending the fundamental facts and laws of development. The selection of types is naturally governed largely by practical considerations and consequently, for very obvious reasons, the chick is probably more widely employed in embryological teaching than any other form. It is interesting too, to note that from antiquity up to the present day the chick has played an important role in embryological research. A history of the growth of our knowledge concerning its development would include a large part of the history of embryology as a whole, while a roster of those who have at some time or another devoted themselves to a study of the embryology of the chick would include the names of many of the greatest personalities in the history of biology and medicine. One need but mention the names of Hippocrates, Aristotle, Coiter, Aldrovandus, Fabricius, Parisanus, Harvey, Highmore, Malpighi, Haller, Wolff, Pander and von Baer; not a complete list by any means.

It is to be regretted that so few of the early contributions to our knowledge of the embryology of the chick are available in a modern language. Until many more are so available it will be difficult indeed to write a satisfactory history of research in chick embryology, which could not fail to be an interesting document. In presenting here a translation of the very earliest systematic daily record of the development of the chick, the aim is to present and make more accessible to historians of embryology an interesting fragment of that history.

The value of the chick as a type form for the study of embryology did not escape the author of the treatise "De natura pueri" which forms a part of the Hippocratic Collection, as is evidenced by a passage* advising a systematic study of the development of the chick as an aid in understanding the development of man. It may, perhaps, be assumed that the author of this treatise practised what he preached; but we cannot be certain, for unfortunately, he has not recorded his observations, or if he did (which is unlikely), they have been lost. He merely states that if one were to open eggs daily throughout the period of incubation one would find that the development of the chick would corroborate his statements, vague and unsatisfying, alas, concerning the development of man.

---

* Ref. 114, t. vii, p. 531.

The immediate successors of the Hippocratic school were apparently not keen enough to appreciate the value of this suggestion, for nowhere in the writings of the ancient Greeks, even in Aristotle, do we find a systematic, *daily* record of the changes to be observed in the development of the chick. Aristotle's statement, however, based, there is little doubt, on actual observation, is the most satisfactory account to be found in ancient literature. Though fragmentary, it is, nevertheless, remarkably good considering the time and the circumstances under which it was written.

Aristotle describes the development of the chick in three periods; first, after about three or slightly more days of incubation; secondly, after ten days; and finally, after twenty days of incubation. His account* may be briefly summarized as follows: The first indication of the chick appears after about seventy-two hours of incubation. At about this time the heart appears, "like a speck of blood, in the white of the egg." It

> . . . beats and moves as though endowed with life, and from it two vein ducts with blood in them wind in a convoluted course; and a membrane carrying bloody fibers now envelops the yolk [the yolk sac], leading off from the vein ducts. A little afterwards the body is differentiated, at first very small and white. The head is clearly distinguished, and in it the eyes, swollen out to a great extent . . . At the outset the under portion of the body appears insignificant in comparison with the upper portion.

The allantoic and vitelline ducts are mentioned as ducts leading from the heart. When the chick is ten days old, all the parts are distinctly visible. The head is still larger than the rest of the body and the eyes, black, and larger than beans, exceed the head in size. The viscera have become more visible. The vitelline and allantoic vessels are described without discrimination between arteries and veins. There is also a fairly good description of the fetal membranes; but no distinction is made between allantois and chorion. At about the twentieth day the chick moves and chirps and is beginning to be covered with down. The yolk sac and chorion are again mentioned, this time as membranes resembling an afterbirth. Then follows a good description of the yolk stalk and its attachment to the intestine. The ultimate inclusion of the yolk sac in the abdominal cavity is also described.

Two thousand years were to pass before this brief account was to be equalled or surpassed! Throughout the Middle Ages no independent observations on the development of the chick were recorded, except, perhaps by Lactantius* who states that he had often observed that the head and eyes of the developing chick are disproportionately large. For the rest, discussions of development slavishly followed Aristotle or Galen (there is no evidence that he studied the developing chick) or presented weird mixtures of their opinions (as, for example, Avicenna), with occasional disagreements based on personal prejudice rather than independent observation.

---

* Ref. 98, 561a–562a.

* Ref. 119, p. 78.

Finally, in the latter half of the sixteenth century, Ulysses Aldrovandus (1522–1605), that strange genius and uncritical encyclopaedist of natural science, obviously inspired by the advice of Hippocrates, whose injunction he cites, undertook to observe and record systematic observations on the development of the chick. We do not know exactly when Aldrovandus began his studies; but we do know that in May, 1564, he encouraged a brilliant student of his, Volcher Coiter, to undertake an independent study of the developing chick. Coiter undertook the task and published his observations in a book which is now one of the rarest of all anatomical works. Its title, translated into English, is: "Tables of the Principal External and Internal Parts of the Human Body, and Various Anatomical Exercises and Observations Illustrated with New, Diverse and Very Ingenious Figures, Extremely Useful, Especially to Those Devoted to Anatomical Study." It was published at Nüremberg in 1572, twenty-eight years before Aldrovandus published the results of his own investigations in the second volume of his ambitiously conceived "Ornithologiae," published at Bologna in 1600. Coiter's account is, therefore, the first systematic statement of the development of the chick published after Aristotle.

The writer's interest in Coiter dates from the first days of his interest in the history of embryology, but the extreme rarity of Coiter's works thwarted for a time the hopes of some day knowing at first hand just what he wrote on the embryology of the chick. When, finally, a fine copy of Coiter's "Externarum et internarum humani corporis tabulae . . . " was offered by Fock, no time was lost in procuring it and after reading the section on the development of the chick, it seemed worthwhile to publish a translation in the hope that it might be of some value to those interested in the history of embryology.

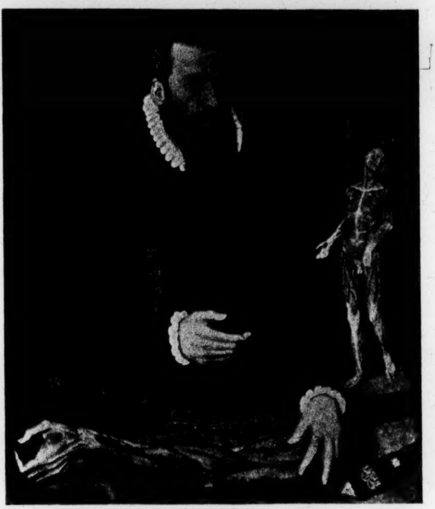
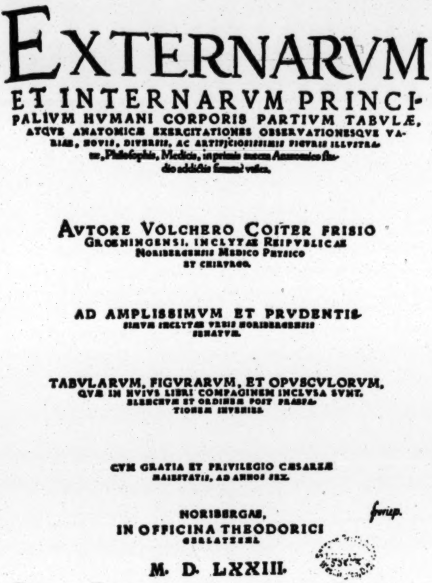


FIG. 1. PORTRAIT OF VOLCHER COITER (1534–1600?) PAINTED IN 1575 BY AN UNKNOWN MASTER WHEN COITER WAS FORTY-ONE YEARS OF AGE. NOW IN THE STÄDTISCHE BIBLIOTHEK, NÜREMBERG.

Few of the details of Coiter's life are available. It is generally agreed that he was born in Groningen, Friesland, probably in 1534. In 1555, at the age of twenty-one, he went to Pisa where he was a student of Fallopius. Later he went to Rome to study under Eustachius, then to Bologna where Arantius and Aldrovandus were his mentors, and finally spent some time at Montpellier under Rondelet. Coiter was called to Nüremberg in 1569 as city physician but soon afterwards entered the German army, as Field-Surgeon under Johann Casimir, prince palatine. According to Will's "Nürnbergisches Gelehrten-Lexicon,"[141] Coiter died a leper on the fifth of July, 1576; but other authorities place the date of his death in 1590 or 1600. He bequeathed his library, his portrait, and an ingeniously fashioned anatomical statuette to the city of Nüremberg. The librarian of the Städtische Bibliothek of that city has kindly permitted me to reproduce Coiter's portrait here. So far as the writer is aware, it was published but once before in 1669 by J. F. Leonhard, according to A. J. van der Aa's "Biographisch Woordenboek der Nederlanden." The artist is unknown but the legend is dated 1575.



EXTERNARVM
ET INTERNARVM PRINCI-
PALIVM HVMANI CORPORIS PARTIVM TABVLÆ,
ATQVE ANATOMICÆ EXERCITATIONES OBSERVATIONESQVE VA-
RIAE, NOVIS, DIVERSIS, AC ARTIFICIOSISSIMIS FIGVRIS ILLVSTRA-
TAE, Philoſophis, Medicis, inprimis autem Anatomico ſtu-
dio addictis ſummè vtiles.

AVTORE VOLCHERO COITER FRISIO
GROENINGENSI, INCLYTAE REIPVBLICAE
NORIBERGENSIS MEDICO PHYSICO
ET CHIRVRGO.

AD AMPLISSIMVM ET PRVDENTIS-
SIMVM INCLYTAE VRBIS NORIBERGENSIS
SENATVM.

TABVLARVM, FIGVRARVM, ET OPVSCVLORVM,
QVÆ IN HVIVS LIBRI COMPAGINEM INCLVSA SVNT,
ELENCHVM ET ORDINEM POST PRAEFA-
TIONEM INVENIES.

CVM GRATIA ET PRIVILEGIO CÆSAREÆ
MAIESTATIS, AD ANNOS SEX.

NORIBERGAE,
IN OFFICINA THEODORICI
GERLATZENI.

M. D. LXXIII.

froriep.

FIG. 2. TITLE-PAGE OF THE 1573 EDITION OF COITER'S "EXTERNARUM ET INTERNARUM PRINCIPALIUM HUMANI CORPORIS PARTIUM TABULAE . . . ," REPRODUCED FROM THE COPY IN THE SURGEON-GENERAL'S LIBRARY, WASHINGTON. SIZE OF TYPE-PAGE, 7¼ × 10½ INCHES.

It is a striking portrait, representing Coiter against a background of medical classics, viewing a dissection of the muscles of the arm. To his left stands the afore-mentioned statuette described by Professor J. J. Baier as follows:

> He has most faithfully represented in a small but scientifically constructed effigy, the origin and insertion of the muscles, the course of the veins, the articulations of the bones, and the ligaments of the limbs in so life-like a manner that experts who have viewed it said that in this statue the artist has proved superior to art itself.*

Coiter left the following printed records, all excessively rare, of his scientific activity.

1. "Tabulae externarum partium humani corporis. In quibus unaquaeque pars variis nominibus et etymologiis . . . explicatur." Bononiae, apud Alexandrum Benaccium, 1564.
   (I have been able to trace only one copy, that in the library of the Hunterian Museum, Glasgow. It is not mentioned in Choulant-Frank.[104] It is included in somewhat modified form in his "Externarum et internarum principalium humani corporis partium tabulae . . . ," 1572.)
2. "De ossibus et cartilaginibus corporis humani tabulae," Bononiae, apud. Joh. Rossium, 1566.
   (Also reprinted in Eyssonius: "De ossibus infantis . . . " Groningae, Typis Johannis Cölleni, 1659, and again in pp. 57–62 of the following work.)
3. "Externarum et internarum principalium humani corporis partium tabulae . . . " Noribergae, in officina Theodorici Gerlatzeni, 1572. (The same text was also issued in 1573. The 1572 issue is the rarer.)

---

* Choulant-Frank,[104] p. 210.

4. "Lectiones Gabrielis Fallopii de partibus similaribus, ex diversis exemplaribus a Volchero Coiter . . . collectae. His accessere diversorum animalium sceletorum explicationes, iconibus . . . illustratae . . . Autore eodem Volchero Coiter . . . " Noribergae, in officina Theodorici Gerlachii, 1575.

The writer is familiar with only the 1573 issue of the third of the works cited above. Printed in folio, it contains xiv + 134 pages and seven plates. Two of the plates represent anterior and posterior aspects of the human skeleton, obviously borrowed from Vesalius. A third and fourth contain excellent figures of the anterior and posterior aspects of the skeleton of a fetus aborted at six months as well as a figure of the skeleton of a much younger fetus. The fifth and sixth give very satisfactory figures of the base of the skull and floor of the intracranial cavity of the fetus and adult. The seventh plate gives an excellent figure of the skeleton of a tailed monkey. The volume contains the following treatises:

1. "Introductio in Anatomiam," pp. ix–xiv.

    A general discussion of anatomy as a science: the etymology of the term anatomy; reasons for the study of it; its usefulness; its relation to other disciplines; its scope; the writers in anatomy, the instruments used in anatomical study, etc.

2. "Externarum humani corporis tabulae," pp. 1–15.
3. "Internarum humani corporis tabulae," pp. 16–31.

    Excellent analytical tables of the principal external and internal parts of the body.

4. "De ovorum gallinaceorum generationis primo exordio progressuque, et pulli gallinacei creationis ordine," pp. 32–39.
5. "Tabulae ossium humani corporis," pp. 40–56.

    Analytical tables describing the bones of the human skeleton.

6. "Ossium tum humani foetus adhuc in utero existentis, vel imperfecti abortus, tum infantis dimidium annum nati brevis historia atque explicatio . . . ," pp. 57–62.

    Brief descriptions of the skeleton of a fetus aborted at six months and of a still earlier one, with a discussion of ossification in each case.

7. "Analogia ossium humanorum, simiae et verae, et caudatae, quae cynocephali similis est, et vulpis," pp. 63–70.

    A good description of the skeleton of a tailed monkey with comparative observations on the skeleton of man, the tailless monkey, the wolf, dog, and fox.

8. "Tabulae oculorum," pp. 71–87.

    Analytical tables of the anatomy of the eye.

9. "De auditus instrumento," pp. 88–105.

> . . . an excellent description of the organ of hearing, including the tympanum, the ossicles, the tensor tympani, the Eustachian tube, the chorda tympani, the aqueductus Fallopii, the two fenestrae, the labyrinth, the cochlea, and the auditory nerve. This is by far the best description of its kind up to the time of Casserius.*

---

* Singer,[129] p. 149.

10. "Observationum anatomicarum chirurgicarumque miscellanea varia, . . . ," pp. 106–133.

An exceedingly interesting series of observations of anatomical and surgical import, of which a few deserve special comment.

(a) He devotes a few chapters to the origin and formation of nerves ("De nervorum origine et procreatione," pp. 107–108) in which he describes the grey and white matter of the spinal cord and the anterior and posterior roots of the spinal nerves. The following passage apparently refers to the spinal ganglia, here described for the first time by Coiter: "Ad foraminum ingressum statim dura inducuntur membrana, quae ad validam funiculorum cum membranis copulationem, in ipsis vertebrarum foraminibus substantia glandulosa eaque dura et crassa, nodo non dissimili, ita sese immiscet atque implicat, ut amplius nulla substantia a se mutuo separari queat."

(b) In a section (p. 109) devoted to the facial muscles he describes for the first time the musculus corrugator supercilii.

(c) There is a short discussion (p. 109) of the ossification of cartilages and ligaments.

(d) There are a number of clinical and pathological observations and it is interesting to note that Coiter advocated the performance of autopsies after death from unknown or obscure diseases.

(e) Other interesting passages deal with experiments on the brains of living animals, the rete mirabile and the stomachs of ruminants. In describing the ovary (Testis muliebris) of ruminants he speaks of vesicles, some of which contain a clear fluid, others a yellow one. ("Vesiculae quaedam continebant aquam limpidam, quaedam luteum humorem," p. 124). On the basis of this statement, Coiter is sometimes credited with the discovery of corpora lutea, but the text gives little support to this contention. The fetuses of pigs, eight and ten days old, are described and briefly compared with the chick in another passage. The lungs of lizards, frogs, and mammals are compared; another section deals with the anatomy of the viper; there is an extended section on the anatomy of birds and another on the anatomy of the bat.

(f)

Most interesting are the observations of Coiter on the living heart [pp. 124–5].

> . . . he examined the living hearts of cats, lizards, serpents, frogs, eels and other fish much in the manner of Harvey. He gives a detailed description of his observations on the heart of a new born kitten, observing that the contraction of the auricles is followed by and is not contemporary with that of the ventricles . . . He noticed that in excised hearts the different parts continue to beat, and that the part in which the pul-

> sation disappears last is the base. He also perceived that pulsation would continue in a small separated part of heart muscle.

The foregoing quotation is from Singer,* in whose work the reader will also find an excellent analysis of Coiter's work on the comparative anatomy of the skeleton, contained in his "Lectiones Gabrielis Fallopii, . . . " 1575.

We turn now to a brief analysis of Coiter's "De ovorum gallinaceorum generationis primo exordio progressuque, et pulli gallinacei creationis ordine" with which this paper is primarily concerned. In order to properly evaluate it, however, one must consider the circumstances under which it was written. It should be borne in mind that Coiter had as a guide in his work, essentially only the work of Aristotle and the benefit of some advice from his teacher Aldrovandus. There was almost nothing to be gleaned from the accounts of Pliny, Albertus Magnus, Avicenna, and other ancient or medieval writers on the subject for they are largely based on Aristotle or Galen. He used no lenses in his work, had no modern atlases to direct him, and no background of accumulated knowledge on the subject to aid him. One advantage he did have. Men of science were beginning to shake off the shackles imposed by authority and Vesalius in his great "Fabrica" and "Epitome" had shown the world how fruitful the direct appeal to facts can be. One of the most remarkable features of Coiter's account is its freedom from scholastic influence; there is no futile quarreling over trifles, no pompous arguments, no theoretical bias, and, except for a few references to Aristotle, Lactantius, Columella and Albertus no appeal to authority, but simply a calm, dispassionate, impartial and concise record of his observations with implicit confidence that the truth will prevail. At the end of his description of the development of the chick Coiter adds without comment short quotations from the writings of Hippocrates, Aristotle and Pliny. If he did nothing else, setting so excellent an example would entitle his work to favorable consideration. Unfortunately many of Coiter's successors did not sustain the high standard set by him.

As compared with Aristotle's account of the development of the chick, Coiter's work represents a distinct though small advance. It is not only far more complete, but is characterized throughout by a greater precision of treatment. Coiter's account of the reproductive system of the hen, for instance, is far superior to the meager statements of Aristotle. He gives a very creditable description of the early blastoderm which was overlooked by the Philosopher; his descriptions of the blood vessels and fetal membranes are more accurate although still far from complete.

Coiter's work is, furthermore, superior to that of Aldrovandus.* It is more detailed, more accurate and less influenced by authority. As Harvey† puts it:

> Ulyssus Aldrovandus, nevertheless, described the formation of the chick in ovo; but he appears to have rather gone by the

---

* Ref. 129, p. 149.

* Ref. 96, pp. 205–228.

† Ref. 112, p. 226.

guidance of Aristotle than to have relied on his own experience. For Volcherus Coiter, living at this time in Bologna, and encouraged, as he tells us, by Aldrovandus, his master, opened incubated eggs every day, and illustrated many points besides those noted by Aldrovandus; these discoveries, however, could scarcely have remained unknown to Aldrovandus.

Aldrovandus, however, deserves the highest credit as the first to undertake systematic observations on the developing chick, although they were published later than those of his pupil, Coiter. Furthermore, as compared with that of Aristotle, his description does represent a slight advance. It would be difficult to adequately compare the account of Aldrovandus with that of Coiter without comparing parallel passages for each day of incubation. The writer originally intended to include such a comparison, but lack of space forbade. A translation of Aldrovandus is planned as the next of a series of translations of early accounts of the development of the chick.

In 1621 Fabricius[107] published a beautifully illustrated monograph on the development of the chick, but unfortunately the text does not measure up to the high quality of the illustrations. Fabricius was still too much under the influence of medievalism to record a straightforward account of his observations. His description is consequently not nearly so clear, systematic or accurate, on the whole, as that of Coiter.

A comparison of Coiter's work with that of his successors must be reserved for another place. The seventeenth century witnessed a great revival of interest in the study of embryology and numerous accounts of the development of the chick were published. The writer is, unfortunately, familiar with only a few of these, namely those of Schoock,[128] Highmore,[113] Langly,[120] Steno[131,132,134] and Malpighi.[122] Of these, Schoock's work may be dismissed as a useless compilation, leaning heavily on Coiter in certain parts. Harvey's and Malpighi's are the best but Highmore's is illustrated with excellent figures and is interesting, further, in that he was first to make use of the microscope in studying development. Steno's accounts are also excellent.

In the following translation of Coiter's study of the development of the chick, no attempt has been made to provide a complete series of comparative passages in the works of Coiter's successors. Such an attempt would have extended the notes to voluminous proportions. The writer has, however, selected a few pertinent passages from Harvey, Steno and others wherever it seemed advisable. Those interested are advised to read Harvey's entire account of the development of the chick since it serves as an interesting commentary throughout.

The writer wishes to express his gratitude to Professors Caplan, Durham, and Laistner of Cornell University for advice where difficulties were encountered. Professor G. W. Corner has been kind enough to review the manuscript. To Mrs. Furr he is especially indebted for aid in making the translation. All defects, however, are the fault of the author himself.

"De Ovorum Gallinaceorum Generationis Primo Exordio Progressuque, et Pulli Gallinacei Creationis Ordine." [On the Beginning and the Progress of Generation of Eggs of the Common Fowl and the Order of Creation of the Chick.]

After I had touched upon matters pertaining to the generation of brutes and the parts characteristic of fetuses at the end of the tables dealing with the internal parts of the human body,[1] I thought it worthwhile to add here my observations on the generation and formation of chicks of the fowl so that a distinction in this respect may now be fully made between quadrupeds and birds, and also in order that certain philosophers may be able to free themselves more easily from all ambiguities and from doubtful questions discussed everywhere in the schools.

I shall begin with the first formation of ova and shall proceed to the ultimate perfection of the egg. Finally, I shall recount in chronological order what new is created on each day while the chick is being formed and endowed with life during incubation. In order that the reader who has read what the naturalists (Hippocrates, Aristotle and Pliny) have taught concerning the procreation of chicks of the fowl may not be offended anywhere nor be delayed in attaining an exact knowledge of the truth (for the authors differ among themselves) and also that no one may be confused and uncertain while reading because of the obscurity or prolixity of my narrative, or because of the contrariety of opinions, I have decided to add the views of writers on this subject in the form of summaries at the end.[2]

Zephyria[3] or wind-eggs (that is, *subventanea*), which, at times, are called sterile and infertile and are formed without the semen of the male, demonstrate that the eggs originate from the females in most birds. Accordingly, about winter time in the common hen, many small yellowish globules are, on account of the shortness of the belly, slowly and gradually collected in a heap just below the diaphragm[4] where the vena cava emerging from the liver pierces it. They are not assembled along the length of the belly as they are in vipers and oviparous serpents where they are spread out on both sides next to the intestines like a necklace of corals or large pearls.[5] In that situation, which is most suitable for fostering the eggs, the extensive and expansive ligaments of the back especially, and also of the surrounding parts give to each egg a separate membrane filled with veins and arteries so that it may receive growth and nourishment therefrom.

When the globules,[6] which in the beginning are few in number and small in size, have grown, first the larger and lower ones and then the rest are thrust out into the first uterus; from this they pass into the second; from the second the perfect eggs emerge; in what manner I shall now make clear by an explanation of both uteri.

Two uteri are found in the hen.[7] One of these is situated higher up and has the form of a broad umbilical cord wound in coils. I have found it to be white in color, empty, and attached to the back. Superiorly it extends to the heap of imperfect eggs which is suspended under the diaphragm from a ligament of the back. It is attached to the heap of imperfect eggs by a very thin membrane. I was unable to find a foramen here through which imperfect eggs or the *seminaria*[8] of eggs might enter this uterus. Moreover the first uterus consists of two tunics, an internal and an external. The internal tunic is white and full of many folds; hence the eggs do not escape before the proper time. The external tunic which conducts to the uterus rather large branches of veins from the vena cava and many arteries from the aorta, is similar to the peritoneum. In this uterus the eggs enlarge greatly and acquire albumen.

The other, lower uterus, through which the semen of the cock is introduced,[9] is about half a finger long, and follows a narrow, constricted orifice,[10] which is dilated to the size of the perfect egg. But this uterus holds the egg loosely. Its substance is thick and it is composed of a tunic of its own and another derived from the peritoneum. The external peritoneal tunic is thin and interspersed with numerous veins and conspicuous arteries. The internal or proper tunic is thicker and bestrewn with much fewer and smaller vessels. This second uterus terminates near two glands which are thought to perform the function of the kidneys in birds. In that place it has a constricted orifice like a sphincter[10] which is followed by the second uterus. No doubt this sphincter is dilated while the egg is entering and constricted again after it has entered. The function of this second uterus is to dry the egg and so harden it by its heat that it may acquire a shell.[11] Whether the prolific semen of the cock is here imparted to the egg, I do not know.[12] The cervix[13] of the uterus is rather long and thick.

Thus far, I have dealt with the origin and final perfection of the eggs; now I shall consider the hatching or bringing forth of young. It should be observed here that gallinaceous chicks just as those of other birds are formed more slowly or more rapidly in accordance with their own nature, the kind of season or region and the constancy of incubation.[14] Columella says: "In the case of the common fowl twenty-one days are necessary during which the eggs are endowed with life and fashioned into the form of birds."[15] Aristotle says: "In the summer, hens hatch out the young on the eighteenth day, in the winter sometimes on the twenty-fifth."[16] [To be continued.]

Notes

1. In his "Internarum humani corporis partium tabulae," forming pages 16–31 of the 1573 edition of "Externarum et internarum principalium humani corporis partium tabulae . . . "

2. At the end of his account, Coiter adds quotations from Hippocrates (Ref. 114, t. 7, p. 537, ll. 7–25, p. 531, ll. 14–24), Aristotle (selections from Ref. 98, vi, 2; Ref. 97, iii, 2), and Pliny (part of Ref. 125, x, 53). These have not been translated since adequate translations are available elsewhere.

3(*a*). Compare the following passages in Aristotle:

"Some embryos are formed in birds spontaneously, which are called wind-eggs and Zephyria by some [Ref. 97, 749*b*] because at spring-time hen-birds are observed to inhale the breezes. [Ref. 98, 560*a*.]

"Such as affirm that wind-eggs are the residua of eggs previously begotten from copulation are mistaken in this assertion; for we have cases well authenticated where chickens of the common hen and goose have laid wind-eggs without ever having been subjected to copulation. Wind-eggs are smaller, less palatable, and more liquid than true eggs, and are produced in greater numbers. When they are put under the mother bird the liquid contents never coagulate, but both the yellow and the white remain as they were. [Ref. 98, 559*b*.]

"Wind-eggs that are called by some *cynosura* and *uria* are produced chiefly in summer. [Ref. 98, 560*a*.] . . . these occur in birds which are not given to flight nor rapine, but which produce many young, for these birds have much residual matter, whereas in the birds of prey all such secretion is diverted to the wings and wing-feathers . . . (The secretion corresponding in hen-birds to catamenia, and the semen of the cock, are residues). [Ref. 97, 749*b*.]

"For the female is, as it were, a mutilated male, and the catamenia are semen, only not pure; for there is only one thing they have not in them, the principle of soul. [Ref. 97, 737*a*.] . . . the animal differs from the plant by having sense-perception; if the sensitive soul is not present, either actually or potentially, and either with or without qualification, it is impossible for face, hand, flesh or any other part to exist; it will be no better than a corpse or part of a corpse. If then, when the sexes are separated, it is the male that has the power of making the sensitive soul, it is impossible for the female to generate an animal from itself alone, for the process in question was seen to involve the male quality. Certainly that there is a good deal in the difficulty stated is plain in the case of the birds that lay wind-eggs, showing that the female can generate up to a certain point unaided. But this still involves a difficulty; in what way are we to say that their eggs live? It is neither possible that they should live in the same way as fertile eggs (for then they would produce a chick actually alive), nor yet can they be called eggs only in the sense in which an egg of wood or stone is so called, for the fact that these eggs go bad shows that they previously participate in some way in life. It is plain, then, that they have some soul potentially. What sort of soul will this be? It must be the lowest surely, and this is the nutritive, for this exists in all animals and plants alike. Why then does it not perfect the parts and the animal? Because they must have a sensitive soul, for the parts of animals are not like those of a plant. [Ref. 97, 741*a*.] Hence in such animals the male always perfects the work of generation, for he imparts the sensitive soul, either by means of semen or without it. [Ref. 97, 741*b*.]

"For if a hen-bird is in process of producing wind-eggs and is then trodden by the cock before the egg has begun to whiten and while it is all still yellow, then they become fertile instead of being wind-eggs. [Ref. 97, 730*a*.]"

3(*b*). See also Thompson's note to Aristotle's "Historia Animalium," 559*b*, for references to legends concerning impregnation by the wind recorded by ancient authors. Aldrovandus and Fabricius also mention them.

3(*c*). Harvey makes this interesting comment:

"Those eggs are called hypenemic (as if the progeny of the wind) that are produced without the concourse of the male, and are unfit for setting; although Varro declares that the mares, in Lusitania, conceive by the wind. For Zephyrus was held a fertilizing wind, whence its name, as if it were ζωηφερὸς, or life bringing . . . Hence the ancients when with this wind blowing in the spring season, they saw their hens begin laying, without the concurrence of the cock, conceived that Zephyrus, or the west wind, was the author of their fecundity [Ref. 112, p. 219]."

4. Aristotle's description of the ovary of the bird is vague and hard to understand inasmuch as it appears inconsistent with his doctrine that the female contributes the matter (catamenia, residues) and the male no material substance but only form to the developing fetus. He says: "The sperm of birds as of animals in general, is white. After the female has submitted to the male, she draws up the sperm to underneath her midriff. At first it is little in size and white in color; by and by it is red, the color of blood; as it grows it becomes pale and yellow all over. When at length it is getting ripe for hatching, it is subject to differentiation of substance, and the yolk gathers together within and the white settles round it on the outside." (Ref. 98, 559*b*.) The ovaries of Vivipara were quite unknown to Aristotle.

Coiter and Aldrovandus, like Aristotle, seem to have had no clear conception of the ovary of the bird as an organ and, of course, did not appreciate its homology with the ovary of Vivipara.

The ovaries of Vivipara were first described as the testes of the female by Herophilus (cf. Galen, "De Semine," Lib. 2, Cap. 1. Ed. Kühn, Vol. 4, pp. 596–597). For centuries thereafter they were referred to as the *testes muliebres* in mammals for they were generally conceived to be concerned in the production of the *semen feminae*.

The first use of the term *ovarium* is encountered in Fabricius' description of the ovary of the hen, in 1621. Fabricius believed that the ovary of the bird constitutes the superior portion of the uterus which, according to him is no more than an infinite number of yolks accumulated into a heap, that is, "Superior matrix nil aliud est, quam infinita propemodum vitellorum multitudo, quae in uno veluti acervo conglobata conspicitur . . . " (Ref. 107, p. 2.) In the first part of his work he refers to the ovary as the *vitellarium* or *vitellorum racemum*, "cum indecorum ut Celsus loquitur, hoc est sine nomine, ab antiquis relictum esse hoc organum videam." (Ref. 107, p. 2.) In the legend of his first plate he introduces the term *ovarium* as synonymous with *superior uterus*. In the text, he also occasionally refers to the *vitellorum ovarium*. He points out that the superior and inferior parts of the uterus play different roles in the formation of the egg: "Etenim superior ad vitelli, inferior ad albuminis, et reliquarum partium, seu totius ovi generationem substituitur, ut sensu patet: in superno enim nil aliud, quam vitellorum multitudo, in inferno vero totum perfectum ovum continetur." (Ref. 107, p. 8.) In this he differs from Aristotle (Ref. 98, *559b*) who did not appreciate the role of the oviduct in the formation of the albumen of the egg.

Follicles or vesicles were described in the so-called *testes muliebres* of Vivipara by Vesalius,[137] Wharton,[140] Fallopius[108] and Coiter; but none of these men had any proper conception of the true function of the ovary of Vivipara. Coiter, for instance, believed that the ovaries were to be compared with the seminal vesicles rather than with the testes of the male (cf. his "Externarum et internarum principalium . . . partium tabulae," etc. 1573, p. 27). Even Harvey thought of the mammalian ovaries as "mere little glands, which rather correspond in their proportions to the prostate or mesenteric glands, the use of which is to establish divarications for the veins, and to store up a fluid for lubricating the parts, than for secreting semen. . . . " (Ref. 112, p. 473.)

In 1667, Steno[133] first pointed out that the so-called *testes muliebres* are analogous to the ovaries of ovipara: "Inde vero cum viderim, viviparorum testes ova in se continere; cum eorundem uterum itidem in abdomen, oviductus instar, apertum notarim; non amplius dubito, quin mulierum testes ovario analogi sunt, quocunque demum modo ex testibus in uterum sive ipsa ova, sive ovis contenta materia transmittatur . . . " (Ref. 131, pp. 152–3.)

In this work, however, Steno does not describe the so-called ova of the viviparous ovary. It was not until 1675, after De Graaf's classical description of the follicles that bear his name had appeared, that Steno published two papers in the *Acta Medica et Philosophica Hafniensia* (vol. 2, pp. 210–232), in which he described as ova, vesicles in the ovaries of several Vivipara, including the mule, in order, as he says, to confirm and illustrate the observations of his friends on the production of animals from eggs:—"Quo magis confirmentur et illustrentur amicorum observationes de productione animalium ex ovo, quae mihi circa eandem veritatem divina monstravit liberalitas . . . " (Ref. 135, p. 210.)

In the meantime in 1668, van Horne[116] had called the follicles of the ovary *ova*. Kerkring[118] in 1671 had described what he believed to be ova in the human ovary, and De Graaf had published his great work "De mulierum organis generationi inservientibus" in 1672. In it he describes three sorts of bodies occurring either normally or abnormally in the ovary. The normal constituents are, first, vesicles full of fluid which are always found, and secondly, globules which are present only after coitus, corresponding in number to the number of fetuses present. The latter are yellow in the cow, reddish in the sheep and ash-colored in other animals. A few days after coitus they contain a limpid fluid but in the later months of pregnancy they become solid. After parturition they gradually disappear. Finally, de Graaf mentions the occurrence of hydatids, tumors and stones as abnormal structures.

Following van Horne, de Graaf calls the ovarian vesicles or follicles ova and asserts that they are normally found in the ovaries of all animals:—"Ova in omni animalium genere reperiri confidenter asserimus, quandoquidem ea non tantum in avibus, piscibus tam oviparis quam viviparis sed etiam in quadrupedibus, ac homine ipse evidentissime conspiciantur" (Ref. 111, p. 181). Further, since the function of the so-called *testes muliebres* is to form ova, they should be called ovaries: "Communis itaque foemellarum testiculorum usus, est ova generare, fovere, et ad maturitatem promovere; sic, ut in mulieribus eodem, quo volucrum ovaria, munere fungantur; hinc potius mulierum ovaria, quam testes, appellanda veniunt; siquidem nullam similitudinem tum forma tum contento cum virilibus testibus proprie dictis obtinent." (Ref. 111, p. 186.)

He gives a good description of the oviducts, the primary function of which is to serve as a passageway for the subtler, more fertile portion of the semen (*aura seminalis*), so that it may moisten the ova in the ovary, which, afterwards released, are taken into the oviducts and conducted by them to the uterus: " . . . judicamus primo verissimum tubarum usum esse, quod in coitione foecunda subtiliori masculini seminis portioni ad testes properanti transitum concedant: ut ova in illis contenta irrorentur, deinde, quod ova ea ratione foecundata, et e testibus propulsa, ab extremitate tubarum excipiantur, ac per internam earum cavitatem ad uterum deducantur." (Ref. 111, p. 237.)

The eggs are released from the ovary by way of a foramen in the vesicle which varies in diameter somewhat, being large enough to admit a probe in the cow but only a hair in the rabbit " . . . brevi namque post coitum ovorum tunicas (quae antea diaphanae erant) opacas devenire conspicimus, multisque sanguineis vasis adornari, et postero die post opacitatem illam conspectam inter dictas eius tunicas glandulosam quandam materiam totum ovum involventem, globulique figuram repraesentantem intueberis, quae sensim accrescens ovum undecumque comprimendo, illud tamdem per foramen in eius medio conspicuum expellit; quod in cuniculis tertio post coitum die, in ovibus, vaccis, aliisque majoribus animalibus, quae diutius uterum gerunt tardius evenit . . .

"Foramen per quod ovum expelli diximus, ante glandulosam globulorum substantiam frustra quaesiveris, quandoquidem immediate ante et post ovi expulsionem tantum appareat, cum aliquali prominentia, quam prae similitudine non inepte papillam nominaveris, cuius foramen pro animalis magnitudine variat, stylum in vaccis, in cuniculis vero tantummodo setam admittit." (Ref. 111, pp. 245–246.)

It was not, of course, until 1827 that the mammalian ovum was actually discovered by von Baer.[100] Steno, van Horne and de Graaf had observed only the follicles containing the ova.

For an interesting account of the etymology of the word *ovarium* see Hyrtl (Ref. 117, pp. 368–369). Weindler[139] traces the history of the ovary in anatomical illustrations and His[115] discusses its relation to theories of generation.

5(*a*). "The other serpents [*the viper excepted*] are externally oviparous, and their eggs are strung on to one another like a lady's necklace . . . " (Aristotle, Ref. 98, 558*b*; cf. also 511*a*18.)

5(*b*). "In the cornua of the uterus of snakes (which resemble the vasa deferentia in male animals), the first rudiments of the ova present themselves as globules strung upon a thread, in the same way as women's bracelets, or like a rosary composed of amber beads." (Harvey,[112] p. 177.)

6. I.e., the growing oocytes.

7. In modern accounts, five subdivisions of the oviduct are recognized: (1) the expanded, thin-walled upper extremity of the oviduct, called the infundibulum; the margins of its wide opening into the abdominal cavity are studded with fringe-like processes, the fimbriae; (2) the long, coiled albumen-secreting portion; (3) the short and narrow isthmus; (4) the somewhat expanded uterus or shell gland, and (5) the slenderer vagina which opens into the cloaca to the left of the opening of the rectum.

The yolk of the egg escapes from the ovary into the infundibulum and from there it passes into the glandular or albumen-secreting portion of the oviduct where it remains about three hours, slowly rotating spirally during its passage down the tube while the albumen is secreted in spiral layers about it. The dense, chalaziferous layer of albumen is first deposited. The shell-membranes, together with the more fluid albumen, are added to the egg in the isthmus while the shell is deposited during its stay in the uterus or shell gland.

Coiter could not find any communication of the upper end of the oviduct with the body cavity and attempts no explanation of how, in the absence of such, the egg passes into the oviduct. He divides the oviduct into two portions, or uteri, a superior uterus corresponding roughly to the infundibular and glandular portions of the oviduct, and a second uterus corresponding approximately to the uterus or shell-gland of modern terminology. He probably also recognized the isthmus (see note 10) and his cervix uteri probably corresponds to what is now termed the vagina. In the first or superior uterus, according to Coiter, the albumen is deposited. In the second or inferior uterus the shell is added.

The first published illustrations of the oviduct of the hen are found in Aldrovandus' account of the development of the chick (Ref. 96, vol. 2, pp. 209–213). The figures, five in number, are based on dissections by Dr. Antonio Ulmus. They are accompanied by a very short notice in the text together with explanatory legends. Although the legends are not as clear as desirable, the last figure indicates that Aldrovandus divided the oviduct into two major divisions: (1) The *corpus uteri*, corresponding to the uterus or shell gland, and (2) the *uterus protensus* which includes the isthmus, albumen-secreting portion of the oviduct and the infundibulum of modern terminology. Three regions of the *uterus protensus* are recognized: (a) the *uteri protensi pars capacitati eiusdem proxima*, i.e., that part of the oviduct adjoining the so-called *capacitas uteri* and corresponding nearly to the modern isthmus; (b) the more vascular *uteri capacitas*, or capacious portion of the oviduct which is approximately equivalent to the albumen-secreting portion of the oviduct, and (c) the *pars suprema uteri protensi praetenius*, i.e., the very delicate, thin-walled, superior portion of the oviduct equivalent to the modern infundibulum. This last portion of the uterus is shown clearly by Aldrovandus to communicate widely with the body cavity. He also realized that the albumen is added to the egg during its passage down the oviduct and states that the shell acquires its hardness in the *corpus uteri*.

Fabricius also speaks of two uteri but his superior uterus is nothing more than the ovary. The term infundibulum was introduced by Fabricius: "Vitellus vero unica propria et ea quidem tenuissima tunica obductus, in membranosam, ac latiorem cavitatem infundibuli formam aemulantem devolvitur; atque ita quasi per tubulum in secundum uterum descendit, atque ingreditur. Hoc enim foramen tubae, et infundibulo est simile, quam ob causam infundibulum appello . . . " (Ref. 107, p. 3.) He uses the term loosely to apply both to the communication of the infundibulum with the body cavity and the infundibulum proper. Because of its membranous character, Fabricius states that he does not consider the infundibulum a part of the uterus. The second uterus of Fabricius, following the infundibulum, he divides into three portions, the beginning, the middle and the end. The first part of the second uterus, according to him, has thick walls and it is here that the chalazae are formed. The middle portion of the second uterus is longer and convoluted. Here the albumen is deposited. In the upper part of the lower segment of the second uterus the two shell membranes are added, while the shell is formed in its lowermost portion.

8. I do not know exactly what Coiter means by *seminaria*. It is probably synonymous with imperfect eggs.

9. See note 12.

10. This is probably the isthmus of modern terminology.

11. Coiter apparently disagrees with Aristotle who (Ref. 97, 752*a*) states that "the shell is at first only a soft membrane, and that it is only after the egg is perfected that it becomes hard and brittle; this is so nicely adjusted that it is still soft when it comes out (for otherwise it would cause pain in laying), but no sooner has it come out than it is fixed hard by cooling, the moisture quickly evaporating because there is but little of it, and the earthy part remaining."

Fabricius,[107] with some misgivings, agrees with Aristotle, but Harvey (Ref. 112, p. 205 ff.), like Coiter, was not led into error.

12. Again Coiter avoids controversy. For a discussion of the views of the ancients regarding the mingling of male and female semen in the uterus see Bloch.[102]

Both Fabricius and Harvey agree that the semen of the male does not reach the cavity of the uterus. Fabricius believed that the semen of the cock was stored in the *bursa* described by him, a statement which is repeatedly denied by Harvey: "This opinion we have already rejected, as well because that cavity [*the bursa*] is found in the male and female equally, as because neither there, nor anywhere else in the hen, have we been able to discover this stagnant semen of the cock; as soon as it has performed its office, and impressed a prolific power on the female, it either escapes out of the body, or is dissolved, or is turned into vapour and vanishes." (Ref. 112, p. 314.) According to Harvey the semen fertilizes the female by a sort of contagion and conception is compared to a conception arising in the brain. Even De Graaf believed that only the subtler portion (*aura seminalis*) of the semen passed up the oviduct to the ovary.

13. Apparently the vagina of modern terminology.

14. Compare Harvey: "The season of the year, the place where the incubation is carried on, the sedulousness with which it is performed, and other accidents, have undoubtedly great influence on this diversity of result." (Ref. 112, p. 256.)

15. Columella,[105] lib. viii, cap. 5.

16. Aristotle,[98] 560*a*.

(*To Be Concluded*)

PIERRE JOSEPH DESAULT

By B. BARKER BEESON, M. D.

CHICAGO, ILL.

THE date of birth as well as the birthplace of Desault have been the subject of controversy. Corlieu claimed that he was born at Magny le-Vernis, in the Haute-Saône Department, on February 6, 1744, while Jean Prat in his excellent thesis devoted to Desault states that Jobert has proved that the illustrious surgeon was born in the hamlet of Moulin Rouge, not far from Vouhenans, on February 6,1738. His parents owned a small farm as well as a mill. They apparently possessed some claims to nobility since the name was originally spelled De Sault and was so written by the surgeon himself even up to the Revolution. Desault was the youngest of six children. He was such a good scholar in the primary grades that his father destined him for an ecclesiastical career but on the boy's insistence allowed him to take up medicine instead. Desault studied at first with a private tutor in the nearby town of Lure. When twelve years old he entered the Collège de Lure where he was taught Greek, Latin, mathematics and literature. He excelled in mathematics. According to Bichat, Desault advanced so rapidly that he had soon outstripped the educational facilities at Lure. Upon the completion of these preliminary studies he attached himself to a barber-surgeon there but soon finding that he required a better preceptor Desault moved to Belfort where there was a large military hospital. There he met a good surgeon who took a fancy to the youth from Lure and secured him a sort of internship in the hospital. This was a godsend since it enabled Desault to study anatomy as well as acquire surgical technique. "De motu animalium" by Borelli of Naples is said to have been his first anatomical textbook.

After three profitable years at Belfort Desault went on to Paris, arriving there in the autumn of 1764. Being poor he was compelled to tutor in geometry. Like his fellows he followed the courses at the Medical School as well as in the College of Surgery which occupied quarters now belonging to the Faculty of Medicine. Desault worked so hard that in 1766 he was stricken with "cachexie scorbutique" which lasted for six months. Following his recovery he embarked upon a teaching career beginning with a course in osteology and continuing with a comprehensive survey of anatomy. At that time anatomy was taught largely by means of charts and wax models owing to a dearth of cadavers. Desault was bitterly opposed to this sort of teaching and he even urged the suppression of all anatomical textbooks. He said, "It is with the scalpel and not by means of books that one becomes an anatomist." Bichat credits him with the introduction of surgical anatomy into France. During the summer months Desault taught elementary surgery. We are told by Prat that he soon became a popular instructor because of his clear and solid teaching. Nothing worth while was omitted. While not gifted with eloquence and suffering from a peculiar pronunciation Desault drove the facts home with such fervor that one soon forgot his defective delivery while admiring a born teacher. Thus he soon attracted large audiences at the expense of the regular professors of both the Medical School and the Surgical College. They protested forcibly against this usurpation of their special privilege, that of giving private courses, by a comparatively unknown upstart and insisted that Desault be put in his place. As a result his teaching was momentarily stopped but his two influential friends, Louis and La Martinière, both surgeons themselves, took up cudgels in his behalf and he soon resumed teaching as a sort of quiz-master for La Martinière so as to sidestep the regulations. Desault's courses derived additional prestige from the fact that Louis himself attended them now and then.

Desault went on in this way for ten years, acquiring an enviable reputation both as a teacher and as a surgeon. He had been desirous for some time of a professorship in the École Pratique which was in reality a part of the College of Surgery. To be a professor in the former one must needs be a professeur agrégé in the latter and moreover pay an entrance fee of 9000 francs, a condition was quite out of the question for Desault's slender purse. In 1776 he became not only a member of the College de Chirurgie but also of the Royal Academy of Medicine. Louis, it is said, not only secured his election to these two bodies but even advanced the necessary fee for the Surgical College. As the final step for admission to this last named body each candidate was required to submit a thesis. As a token of gratitude Desault devoted his thesis to the consideration of an instrument which Louis had recently introduced from England. This was the gorget of the English surgeon, Hawkins. Desault had modified it somewhat so as to make it more suitable for the removal of bladder stones. His thesis, as was then the custom, was written in Latin and was entitled, "De calculo vesicae, eoque extrahendo proevia sectione ope instrumenti Hawkinsiani emendati." It was the first thesis to be heard in the new home of the Académie de Chirurgie which is now the small amphitheater of the present Faculté de Médecine. According to M. A. Petit it was a document of slight importance.

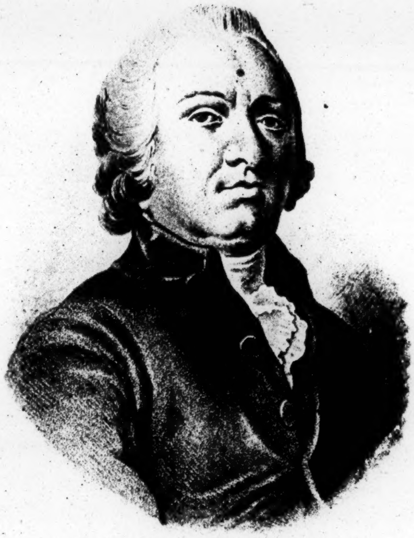


FIG. 1. PIERRE JOSEPH DESAULT.

In 1776 Desault had been made consulting surgeon to the Hospice des Écoles where he had a service for the wounded but was unable to practice surgery on a large scale. After six years there Desault became chief surgeon to the Charité Hospital upon the death of P. Baseilhac. His three years there were very profitable resulting in studies on dislocations of the radius, fractures of the olecranon, varicose ulcers, etc.

January 8, 1782 Desault was united in matrimony to Marguerite Thouvenin.

February 27, 1785, Desault came into his own, being appointed chief surgeon to Hôtel-Dieu, succeeding the late Jean Baptiste Ferrand. It is said that the influence of Louis again aided his pupil since he had a formidable rival in Pelletan. A copy of the decree naming Desault to this post has been unearthed by Prat in the archives of L'Assistance Publique. It reads as follows:

> Monday, February 27, 1785, an extraordinary session was held at the Archepiscopal Palace. Besides the regular members there were present Monseigneur the Archbishop and Monseigneur Dalègre, the first president. The Company has chosen and named Pierre Joseph DeSault, Master of Surgery, Councillor to the Royal Academy of Surgery, Professor of Anatomy and of Surgery in the École Pratique, Consulting Surgeon to the Schools and Surgeon-in-chief of the Charité Hospital in this city, as Chief Surgeon to Hôtel-Dieu.

In this way Desault came to what is the oldest hospital in Paris and one of the best known in the world. At that time it contained 3000 patients who were housed in a most haphazard and unsanitary manner, two or three persons often sharing the same bed. There was no supervision either as to diet or visitors and the nursing was most defective. Desault wished not only to reform all this but also to utilize the vast amount of material for teaching. His opportunity to register a protest against the deplorable conditions prevailing at Hôtel-Dieu was not long in presenting itself. January 16, 1788, the hospital board asked for suggestions from the physicians at Hôtel-Dieu as to its amelioration. Desault is said to have been the sole complainant. His letter is quoted in extenso by Prat and is a most interesting document. In it he registers a most vigorous protest against the existing conditions and makes some illuminating suggestions for their betterment. As a result of Desault's intervention the hospital administration ruled that the chief surgeon should have control over the diet of his patients and also be the judge as to who was to be discharged as well as to enforce the rules as to the service and policing of the wards in accordance with the recommendations of Desault.

The religious order charged with the conduct of Hôtel-Dieu would not accept this defeat and in March, 1789, wrote to the hospital board a letter in which Desault was most bitterly assailed. He was particularly criticized for wishing to admit large numbers of students to the hospital and also for desiring to show patients before crowds as well as to operate upon them in public. He was also accused of upsetting the regular routine of the institution as well as of neglecting his duties. To this Desault replied in a letter bristling with sarcasm in which he admonished his accusers to themselves practice hospitality and the other Christian virtues instead of devoting so much time to plotting against him. On April 2, 1789, the hospital board met with the Archbishop of Paris and after a thorough discussion of the matter voted to agree entirely with Desault. His opponents still struggled on but were finally defeated when Necker, the financier and close friend of the King, prevented them from airing their views before Parliament. After this Desault was recognized as the real master of Hôtel-Dieu.

Desault at once began to inaugurate the desired reforms. Up to then the teaching had been largely theoretical and seldom accompanied by the actual demonstration of cases. As a result the students while often adept at enunciating endless theories were veritable tyros when it came to the art of medicine and surgery. Desault soon changed this and organized the first real teaching clinic in France and what has been termed the best one of its day in Europe. Like Dupuytren he was a very hard worker and although married and having an apartment in the Rue de la Harpe, close by and just off the Place Saint-Michel, Desault always slept at the Hôtel-Dieu so as to be near his patients. He began making rounds at six A.M. and finished about two hours later. After that he held a public clinic for the poor. According to Bichat Desault himself carefully questioned and examined all of these patients, afterwards comparing his findings with their histories. Following this the pupils attached to Hôtel-Dieu read the detailed observations of those entrusted to their care, especially those who were to be discharged that same day. Each of these histories was a daily summary of each patient. Before coming to the operative part of the clinic there was a thorough discussion of each case, the probable result of the operation, the means of aiding recovery and the type of operation to be performed. Then the patients were taken to the amphitheater, which Desault had caused to be built, and operated upon by him assisted by the hospital surgeons. Following his operative work Desault frequently spoke about the disorders existing in the hospital or else regarding the condition of those who had undergone operation the day preceding. Bichat says that Desault often ended his morning's work with instruction in the art of dissection or else he gave a lecture on some particular point in pathology. He usually left for his home about noon and spent the afternoon in attending to his private practice. Six P.M. again found him at Hôtel-Dieu where he made rounds and wound up the day's work with a lecture in the amphitheater upon some anatomical or surgical topic. This unceasing activity made Desault's clinic the best known in Europe and visitors came from far and near. Not a few of the foreign governments even subsidized certain of their best students and sent them to Paris expressly to follow the clinics of Desault. Louis Philippe is said to have been a frequent visitor at Hôtel-Dieu. Desault's clinics were published in the *Journal de Chirurgie* by his pupils. That publication according to Prat appeared during 1791–1792. His "Surgical Works" were published under Bichat's direction, in three volumes, from 1798–1803. Chopart and Desault also wrote a "Traitè des maladies chirurgicales et des operations qui leur conviennent." This came out as two volumes which Bichat is also credited with publishing.

In 1788 Desault had been made a member of the commission which was charged with determining the fitness of the army medical officers. Servan, Minister of War, in 1792, made him one of the Board of Health charged with keeping the Republican armies in good health. In 1795 the

École de Santé was formed to replace the former Faculté de Médecine as well as the College of Surgery. By reason of his prominence Desault was selected to fill one of the chairs of clinical surgery, the other one being allotted to Pelletan. January 31, 1795, is the date given by Corlieu as the time of Desault's entrance into his professorial position. Even this nomination did not console him for what he had suffered. Desault adored surgery but disliked medicine, which may be said to have been his outstanding weakness.

Desault made a number of original contributions to surgery. Among them may be mentioned, (1) a simple apparatus for the treatment of fracture of the clavicle; (2) immediate ligation of the arteries following amputation; (3) the application of a single ligature above an aneurysm; (4) the use of a straight rather than a curved knife for amputation; (5) the treatment of fracture of the lower end of the humerus; (6) the treatment of lacrimal fistula; (7) an operation for harelip; (8) the incision of anal fistula; (9) the ligature of polypi and (10) the resection of the tonsils. In cases of hydrocele after withdrawing the fluid Desault filled the sac with red wine.

In his thesis devoted to an exhaustive history of gonorrhea Dr. Ernest Roucayrol refers at length to Desault's skill in the treatment of urethral strictures, which he called "brides." "For their dilatation he preferred elastic bougies which were introduced with a corkscrew-like motion." Desault is credited with originating the so-called *catheterisme appuyé* which consists in passing a bougie up to the stricture and then exerting pressure upon it until the resistance is overcome. Desault preferred this to a forcible dilatation which was a favorite with many and was termed "tour de maître." It has been responsible for many false passages. Roucayrol quotes Petit-Radel as follows regarding Desault's treatment of urethral stricture:

> We have many times, with astonishment, seen Monsieur Desault pass a silver sound of small calibre or even one of medium size, in persons in whom the canal was so narrowed that the urine escaped, drop by drop or else did not flow at all. For the past six years he has at Hôtel-Dieu, constantly, twenty to thirty such cases which he treats in this manner.

Desault was one of the first to describe laryngeal polyps then considered a rarity. He was an ardent defender of tracheotomy both for the reestablishment of the passage of air as well as for the removal of foreign bodies.

Although a member of the various scientific medical bodies Desault seldom attended their sessions. Upon being reproached for this he replied, "I resemble the saline substances in that I crystallize only in repose."

During the quiet period which followed the downfall of Robespierre and the Terrorists on the 9th Thermidor or July 27, 1794, Desault asked for permission to improve the medical teaching but the Committee on Public Instruction had already decided to replace both the Faculty of Medicine and the College of Surgery with the École de Santé.

Desault had two most unpleasant experiences with the bloodthirsty minions of Robespierre. He was first arrested on August 10, 1791, at the instigation of Chaumette, the procureur syndic of the Commune of

Paris, and charged with failure to care for the wounded of that day's fighting. Being dragged before the sanguinary Revolutionary tribunal Desault was acquitted with difficulty. On May 28, 1793, Desault was seized while in the midst of a clinic at Hôtel-Dieu and incarcerated in the Luxembourg Prison. He was released three days later because of the many protests which his arrest brought forth. These experiences rendered the surgeon extremely prudent as is shown by his conduct when called upon to verify the fee asked by the surgeon Deschamps for embalming Marat. Prat quotes Desault as follows:

> After having ascertained from several apothecaries the cost of the different substances which are ordinarily used for embalming and after evaluating the demands of such an operation I believe myself to be correct in saying that the sum of 1500 francs ought to cover the entire expense of embalming the body of Marat. The sum of 6000 francs [the amount asked by Deschamps] would not be excessive if it were necessary to gratify the pride and vanity of a rich man; but a republican should find compensation for his work in the honor of having helped to preserve the remains of a great man whom his country wishes to honor.

An interesting phase of Desault's career concerns his relations with the Dauphin or eldest son of Louis XVI and Marie Antoinette who was called the Capet child by the Revolutionists and who has gone down in history as Louis XVII. Desault, it is said, first saw him on May 6, 1795, at the order of Barras. Finding the child a victim of tuberculosis he advised his removal to the country but was overruled by the powerful Committee of Public Safety which ordered Desault to carry on his treatment in the Temple Prison where the young prince grew steadily worse. Our surgeon visited his patient daily, about nine A.M. and out of pity for one whom he regarded as doomed he remained as long as the jailers permitted. Cabanès quotes Eckard as saying that the young prince was most appreciative of Desault's kindness and even conversed with him, a thing he did not do with his jailers or other visitors. Cabanès also mentions that a niece of Desault, Madame Agatha Thouvenin, after his death stated that her uncle had repeatedly claimed that when he was first ordered to see the young prince in prison he was shown a child whom he did not recognize as the former heir to the throne. Madame Thouvenin is also credited with asserting that on the very day on which Desault submitted his report on the state of the prisoner's health he was tendered a banquet by the Conventionels, who had succeeded the Terrorists in power and being taken ill soon thereafter he died four days later. This was because, suspecting a substitution for the real Dauphin, Desault had tried to solve the mystery. Jacques Boitlaut, a former valet to Louis XVI, has been quoted as asserting that the Dauphin was smuggled out of prison and another child substituted for him. He said, "Madame Desault did not conceal from me the fact that her husband had been poisoned in order to hide the truth in this affair."

Coming to Desault's last illness and death we find that he last attended to his practice on May 30. That night he was seized with a high fever. Chopart, fearing a brain lesion, did venesection on one foot and permitted copious bleeding. Corvisart came the next day and found his friend delirious. In spite of the devoted efforts of those in attendance Desault steadily failed and he died June 1, at ten P.M. in the same quarters, 18, rue du Cloître-Notre-Dame where Bichat himself was destined to pass away seven years later. An autopsy was performed by Corvisart assisted by Lepreux and Laurens. The protocol as reviewed by Bichat suggested a brain lesion. Cabanés believed that Desault had succumbed either to a typhoid fever or a cerebrospinal meningitis. He scouted the idea that Desault had been poisoned. Bichat who was one of those most intimate with the late surgeon also opposed the idea that he had been done away with. Chopart himself died six days later and the unfortunate Dauphin did not long survive Desault.

The *Monitor* referred to Desault as follows:

> France and all of Europe has just lost Citizen Desault, Chief Health Officer of the Hospice of Humanity [this was the Revolutionary title for Hôtel-Dieu]. He was the first in the practice as well as in the teaching of his art. His name has long been celebrated in all those countries where surgery is honored: his name will not perish. His country is indebted to him for many works and numerous pupils. At this time, the Republic has not an army whose best medical officers are not Desault's pupils. Desault was an excellent citizen. Our recent tyrants persecuted him. Their last accomplices caused his death.

Bichat expressed the belief that the fighting incident to the attempt of the Terrorists to regain power on the Ièr Prairial or May 20, 1795, did much to hasten Desault's end. He feared a resumption of the numerous executions and the horrors attendant thereon. After that day he became morose and melancholy.

Physically, Desault was short but well built. His features were well developed with a high forehead. Marc Petit said that he carried his head erect and that his face was round and highly colored.

Desault disliked going in consultation according to Petit owing to an extreme timidity and embarrassment. He gave his opinion with conviction but could not bear contradiction. His timidity he endeavored to conceal under a brusqueness and apparently rough manner especially in the presence of his pupils.

By reason of his pioneer work in surgical anatomy, his early attempt to improve hospital services, both for the sick and the students and also because of the illustrious pupils whom he trained Desault is entitled to high rank not only among French surgeons but among those of all countries. Among his outstanding pupils were Bichat, Corvisart, M. A. Petit, Alexis Boyer and Philibert Roux, the successor of Dupuytren.

REFERENCES

1. PRAT, J. Un chirurgien au XVIII siècle, J. P. Desault (1738–1795). Thèse de Paris, Marcel Vigné, 1929.
2. CORLIEU, A. Centenaire de la Faculté de Médecine de Paris (1794–1894). Alcan, Asselin and Honzeau, Baillière, Battaille Carré, Doin, Masson, Rueff, Schleicher, Steinheil, Paris, 1896.
3. ROUCAYROL, E. Considérations historiques sur la blennorragie. Thèse de Paris, 1907.
4. CABANÉS. Les morts mysterieuses de l'histoire. Deuxième série. Rois, Reines et Princes Français. De Louis XVIII à Napoléon III. Paris, Michel, 1919.
5. DESAULT, P. J. Oeuvres chirurgicales ou exposé de la doctrine et de la pratique de P. J. Desault. Par Xavier Bichat. 3 vol., Ed. 3, Paris, Méquignon, 1813.

THE HISTORY OF PURPURA HEMORRHAGICA*

By HAROLD W. JONES, M.D. AND LEANDRO M. TOCANTINS, M.D.

PHILADELPHIA

Origin of the Word

PURPURA is the Latin derivative from the Greek word *porphyra* (Πορφύρα), the designation for the purple-fish (Purpura lapillus) a gastropod mollusk, from the gills of which a purple dye was obtained.[1] The word was used for many centuries in Greek and Roman times to designate the color purple and related connotations, but as applied to disease, it did not come into general use until the sixteenth century or thereabouts. No definite references to this condition, under this specific denomination, are found in the medical works of the ancients. About the sixteenth century, however, epidemics of spotted fever (either plague, typhus or cerebrospinal fever) were prevalent; these were called purpuric fevers (*le pourpre* or *purpura* in Latin). Following that, the term purpura was used to designate any eruption of purple color. For a time it was set forth as one of the exanthemata. Porchon[2] in 1688 wrote a work which he entitled: "New Treatise on the Purple, the Measles and the Small Pox, etc." and De Galtier[3] had published "A Manual Showing how to Avoid Catching the Epidemic Malady Commonly Called the Purple."

With the discovery that the purple spots often came independent of fevers, the word acquired a narrower meaning. In 1700 expressions such as "purpura sine febre," "petechiae sine febre," etc. appeared in medical publications. The term purpura hemorrhagica was coined by Willan[4] in the first edition of his treatise "On Cutaneous Diseases" (1801) and not by Bauer,[5] as originally thought, whose inaugural thesis did not come out until 1824.

Earliest References

Petechia and vibices were observed, even by Hippocrates, in the fevers of Thrace and Thessaly. (Epid. lib., VII).

In his "Treatise of Internal Affections"[6] he describes, under the name of ειλεος αιματιτης a condition that greatly resembles purpura; there was fetid breath, swelling of the gums and large bleeding ulcers in the lower extremities. From this meager description it may be too much to assume that these were purpuric manifestations, considering the prevalence of scurvy in those times. But there are in the Hippocratic writings three other passages strongly suggestive of purpura:

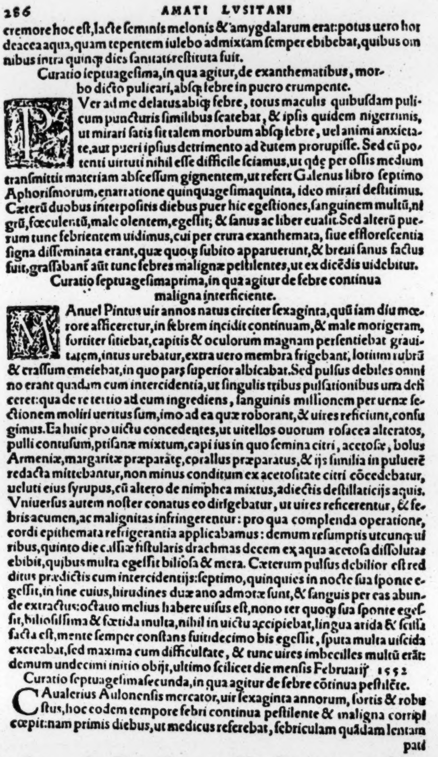
> In estival fevers, around the seventh, eighth or ninth day, rough miliary spots appeared which smarted but were not strongly itchy. They remained until the end. I did not see any such eruptions in males; in women they appeared before death and they were taken with drowsiness and became stuporous. ["De Morbis Popularibus," lib. 2, sect. 3.]
>
> Many were taken severely by the spitting fever, but more women; when seized they became thinner, suffocated

---

* Read before the Section on Medical History, College of Physicians of Philadelphia, January 13, 1932.

From the Department of Medicine, Jefferson Medical College. Prepared under a grant from the J. Ewing Mears Research Fund.

and vomited, even when fasting, much bile and saliva; and while they suffered with pain in the chest, back and other parts, the skin filled with red eminences as if burned by the nettle. ["De Morbis Tit.," lib. 2, sect. 68.]



286 AMATI LVSITANI

cremore hoc eſt, lacte ſeminis melonis & amygdalarum erat: potus uero hordeacea aqua, quam tepentem iulebo admixtam ſemper ebibebat, quibus omnibus intra quinq; dies ſanitati reſtituta fuit.

Curatio ſeptuageſima, in qua agitur, de exanthematibus, morbo dicto pulicari, abſq; febre in puero erumpente.

PVer ad me delatus abſq; febre, totus maculis quibuſdam pulicum puncturis ſimilibus ſcatebat, & ipſis quidem nigerrimis, ut mirari ſatis ſit talem morbum abſq; febre, uel animi anxietate, aut pueri ipſius detrimento ad cutem prorupiſſe. Sed cũ potenti uirtuti nihil eſſe difficile ſciamus, ut qdę per oſſis medium tranſmittit materiam abſceſſum gignentem, ut refert Galenus libro ſeptimo Aphoriſmorum, enarratione quinquageſimaquinta, ideo mirari deſtitimus. Cæterũ duobus interpoſitis diebus puer hic egeſtiones, ſanguinem multũ, nigrũ, fœculentũ, male olentem, egeſſit; & ſanus ac liber euaſit. Sed alterũ puerum tunc febrientem uidimus, cui per crura exanthemata, ſiue efflorescentia ſigna diſſeminata erant, quæ quoq; ſubito apparuerunt, & breui ſanus factus fuit, graſſabant aũt tunc febres malignæ peſtilentes, ut ex dicẽdis uidebitur.

Curatio ſeptuageſimaprima, in qua agitur de febre continua maligna interficiente.

MAnuel Pintus uir annos natus circiter ſexaginta, quũ iam diu mœrore afficeretur, in febrem incidit continuam, & male morigeram, fortiter ſitiebat, capitis & oculorum magnam perſentiebat grauitatem, intus urebatur, extra uero membra frigebant, lotium rubrũ & craſſum emeiebat, in quo pars ſuperior albicabat. Sed pulſus debiles omnino erant quadam cum intercidentia, ut ſingulis tribus pulſationibus una deficeret: qua de re tertio ad eum ingrediens, ſanguinis miſſionem per uenæ ſectionem moliri ueritus ſum, imo ad ea quæ roborant, & uires reficiunt, confugimus. Ea huic pro uictu concedentes, ut uitellos ouorum roſacea alteratos, pulli contuſum, ptiſanæ mixtum, capi ius in quo ſemina citri, acetoſæ, bolus Armeniæ, margaritæ præparatę, corallus præparatus, & ijs ſimilia in puluerẽ redacta mittebantur, non minus conditum ex acetoſitate citri cõcedebatur, ueluti eius ſyrupus, cũ altero de nimphea mixtus, adiectis deſtillaticijs aquis. Vniuerſus autem noſter conatus eo dirigebatur, ut uires reficerentur, & febris acumen, ac malignitas infringerentur: pro qua complenda operatione, cordi epithemata refrigerantia applicabamus: demum reſumptis utcunq; uiribus, quinto die caſſiæ fiſtularis drachmas decem ex aqua acetoſa diſſolutas ebibit, quibus multa egeſſit bilioſa & mera. Cæterum pulſus debilior eſt redditus prædictis cum intercidentijs: ſeptimo, quinquies in nocte ſua ſponte egeſſit, in fine cuius, hirudines duæ ano admotæ ſunt, & ſanguis per eas abunde extractus: octauo melius habere uiſus eſt, nono ter quoq; ſua ſponte egeſſit, bilioſiſſima & fœtida multa, nihil in uictu accipiebat, lingua arida & ſciſſa facta eſt, mente ſemper conſtans fuit: decimo bis egeſſit, ſputa multa uiſcida excreabat, ſed maxima cum difficultate, & tunc uires imbecilles multũ erãt: demum undecimi initio obijt, ultimo ſcilicet die menſis Februarij 1552

Curatio ſeptuageſimaſecunda, in qua agitur de febre cõtinua peſtilẽte.

CAualerius Aulonenſis mercator, uir ſexaginta annorum, fortis & robuſtus, hoc eodem tempore febri continua peſtilente & maligna corripi cœpit: nam primis diebus, ut medicus referebat, febriculam quãdam lentam

pati

FIG. 1. ON THIS PAGE OF HIS CURATIONUM MEDICINALUM, LUSITANUS GIVES HIS ACCOUNT OF WHAT HE TERMED "MORBUS PULICARIS ABSQUE FEBRE." (CURAT. SEPTUAGESSIMA.)

With saltish sputum and as the cough was suppressed, the body turned red with blisters; which became worse before death. ["Coacae Praenotiones," no. 243.]

The last two references are the most pertinent and all the more because we realize how frequently purpuric manifestations occur in cases of tuberculosis. May it not be true that Hippocrates had made reference here to a case of tuberculosis?

Several centuries later, Celsus (De re medica, lib. 2, sect. 7) described a condition with symptoms similar to those set forth by Hippocrates in his "Treatise of Internal Affections" with, in addition, hemorrhages from the nose and other parts of the body. He blames them on morbid enlargement of the spleen.

Galen[7] mentions the occurrence of epistaxis, glandular enlargement and the appearance of red spots in describing complications of certain epidemic fevers. Aetius[8] says that:

> At an early period of fevers, which are not simple but originate from a depleted state of humors, livid spots, resembling gnat bites, appear over the whole body, whereas, in malignant and pestilential fevers, there are phlyctaenae, some of which assume the form of carbuncles.

Hemorrhagic complications of acute fevers were often mentioned by the ancients in both medical and literary writings. In Lucan's "Pharsalia" there is a striking passage remindful of this condition. While painting the difficulties of the Roman army in its march through the Libyan desert and the decimation inflicted by disease, Lucan says:[9]

But fertile Libya still new plagues supplies
And to more horrid monsters turns their eyes.
Deeply the fierce Haemorrhois imprest
Her fatal teeth on Tullus' valiant breast. . . .
So the warm blood at once from every part
Ran purple poison down, and drained the fainting heart.
Blood falls for tears, and o'er his mournful face
The ruddy drops their tainted passage trace.
Wherever the liquid juices find a way,
There streams of blood, there crimson rivers stray;
His mouth and gushing nostrils pour a flood,

And e'en the pores ooze out the trickling
blood;
In the red deluge all the parts lie drown'd
And the whole body seems one bleeding
wound.

The poet attributed the bleeding to the bite of the serpent Hemorrhois, an African snake, the venom of which causes profuse hemorrhage. Naturalists, however, doubt the existence of such a serpent.

Strange as it may seem, Rhazes,[10] the distinguished Arabian physician, whose observations in many conditions have been most accurate, failed to mention, in his treatise on smallpox and measles, the presence of hemorrhagic manifestations, although these symptoms are frequently met in these two diseases. We know, however, that purpuric manifestations are much less common in the torrid zone and in the dark skinned races, which may explain Rhazes' omission.

As learned a scholar as Adams,[11] whose knowledge of the ancient medical writings was equalled by few, stated that "none of the Greek or Latin authorities has given any distinct account of purpura. Avicenna, an Arabian (980 A.D.), has briefly described it in its chronic form (IV, 3, 1, 8)."

The tendency to invariably associate purpuric manifestations with pestilential fevers is evident until the first part of the sixteenth century; Fracastorius,[12] relating the fevers he had encountered in Italy in 1505 and 1506, described a type accompanied by the appearance of spots which he called lenticulae, puncticulae or peticulae. These fevers he termed petechial fevers, from the word petechia (Neolatin), signifying spot, and claimed to have been the first to draw attention to them.

PURPURA VIEWED AS A DISTINCT MANIFESTATION; NOT ASSOCIATED WITH FEVERS

Among the first to record a case of purpura independent of fevers was Amatus Lusitanus.[13] In 1557 he described such a condition, calling it "morbus pulicaris absque febre." Lusitanus enjoyed his greatest reputation in the first part of the sixteenth century. He was born in Portugal, studied medicine in the University of Salamanca and spent most of his life fleeing from one country to another because of religious persecution. The description appears in his chief work, "Curationum medicinalum" (Fig. 1). Lusitanus tells briefly about a boy brought to him with dark macules, resembling flea bites, covering his entire body. The boy had no fever and for several days had bloody discharges, eventually recovering. Lusitanus quotes Galen and speculates whether the rash was due to nervous anxiety or an exudation of detrimental humors.

Eugalenus[14] is, probably, the first writer to give a clear description of purpura. Under the title "scurvy," he furnishes three or four distinct cases in which the purple eruption was connected with hemorrhage from the gums, lungs and bowels. He ascribes the complaint to a putrid diathesis produced by gross food, salt or stagnant water and the moist cold atmosphere.

It was not until the early part of the seventeenth century that a more exact description of purpura was set forth. From the following quotations of La Rivière's "Praxis medica"[15] it is evident that the writer had a clear conception of purpura. On page 618, when dealing with pestilential fevers, he states:

> Neither are those purple spots any such pathognomonick sign, although a Malignant Feaver is from them termed the spotted Feaver, for as much as many have a Malignant Feaver without any such spots and those spots do sometimes appear on women that want their courses, and in some children by reason of a light ebullition of Blood, without any Feaver, which I have often seen in both.

Further on he draws attention to the hemorrhages and petechiae, emphasizing their difference from those seen in fevers thus:

> Purple spots like flea bitings, called by later physitians Peticulae or Petechiae, are the proper and peculiar signs of a malignant feaver, for they are found in no other kind of feaver; forasmuch as they do arise from a vitious quality of the Blood or other Humors, joyned with Malignity. Yet there do appear in other Diseases, spots very like unto those aforesaid, but springing from a far different cause; viz. From the over thinness of the Blood, which being exagitated by the heat or the expulsive faculty, does sprout forth of the capillary veins into the Skin. These spots are wont for the most part to appear in such as have some flux of blood, because the blood in such is more thin and watry; and also in Splenetick persons, in such as have the Jaundice and old obstruction of the bowels and (in a word) in all such, who by reason of the weakness of their Bowels, do breed watry blood and are apt to fall into a Cachexy. For in such Persons the blood, being made thinner than ordinary, sometimes flows out at the nose, sometimes at some other part, and sometimes it comes out of the capillary veins into the Skin; where being retained, it looseth its own color, and becomes either blewish, or black, or light red, and causes great variety of spots; which, notwithstanding, are very far different from the spots of Pestilential Feavers, and do argue nothing but the watry thinness of the blood and weakness of the liver.[16]

In the same work one notes the significant fact that La Rivière places scurvy in the chapter dealing with diseases of the spleen. Some of the cases of scurvy discussed in this chapter have a strong resemblance to purpura. La Rivière, himself, perceived that the cases he reported were not typical of scurvy and pointed out that that disease was rare in France. This fact, along with the knowledge he evinced of purpuric manifestations apart from malignant fevers, is enough to convince us that he had a clear idea of the existence of purpura. La Rivière, therefore, stands as the first to definitely record the presence of purpuric phenomena in conditions other than pestilential fevers.

ATTEMPTS TO SUBDIVIDE PURPURA INTO CLINICAL ENTITIES

This tendency was manifest in the first part of the eighteenth century.

Hornung[17] in 1734 divided purpura into three groups: simplex, febrile and scorbutica. One year later Werlhof[18] described the condition and called it "morbus maculosus hemorrhagicus." From this description originated the term "Morbus maculosus Werlhofii" although this denomination did not appear in the medical literature for nearly one hundred years after the original description. Willan[4] makes but a cursory reference to Werlhof in his capable dissertation published in 1801.

Paul Gottlieb Werlhof was one of the most distinguished physicians of his day. He was First Physician to King George II of England in his German States, an accurate observer and sided strongly with the Methodists against the Empiricists. In 1775 Wichmann collected and published

Werlhof's works under the title "Opera medica." The portion dealing with purpura appears as an unpretentious note, roughly two hundred words, buried among other notes, and grouped by Wichmann under the title "Excerpta e commercio norico." Werlhof describes briefly the case of a girl, who at the time of her menstruation, suddenly developed epistaxis and large purple blotches in the neck, back and arms. In the same edition of Werlhof's works Wichmann included a letter to Werlhof from Behrens,[19] an obscure physician, who had, in 1735, already set forth this condition and given it a name similar to that advanced by Werlhof. Stieldorf,[20] in his Strasburg thesis on purpura, confirms the fact that Behrens described the condition at the same time as Werlhof but, as is so often the case, the great physician receives the credit for the observation and the little known practitioner goes ignored.

In his account of the history of purpura in 1752 Raymann[21] called the purpuric spots seen in afebrile affections "petechiae mendaces" (lying petechiae) in contradistinction to the febrile petechiae which he denominated "sincerae."

The contributions of Willan[4] to the study of purpura are not given their true value today. He described and was acquainted with many of its varieties as we know them today, but failed to set forth some of these groups as entities. Later writers gave them names and received the renown. Among his observations is a detailed account of the case of a woman with acute gastrointestinal disturbances, bloody stools and purpura, a condition later named Henoch's purpura. He set forth a classification of purpura as follows:

1. Simplex
2. Hemorrhagica
3. Urticans
4. Contagiosa

and coined the term by which the condition is most generally known today, purpura hemorrhagica.

Schönlein[22] in 1829 collected several cases of purpura with acute arthritic manifestations. He divided purpura into three groups: (1) purpura hemorrhagica or peliosis Werlhofii, (2) peliosis senilis and (3) peliosis rheumatica.

Henoch's Purpura: Henoch,[23] in 1868, stated that he saw no justification for the use of the term peliosis rheumatica; first, because the element of exposure could not always be demonstrated and, secondly, because he felt that the same condition which produced the joint symptoms also produced the hemorrhagic phenomena. From his practice he collected and described 5 cases of purpura in children in whom, besides the purpura, there was vomiting, abdominal pain, intestinal hemorrhage, no fever and, with but one exception, joint manifestations. This form of purpura, he thought, should be distinguished from the variety for which he reserved the term "purpura hemorrhagica" by the presence of pain, swelling of the joints and intestinal symptoms. For many years this type of purpura has been called Henoch's purpura.

Henoch[24] also described in 1887 a rapidly progressing fatal type which he termed purpura fulminans. We know today that many of these cases are found in children with cerebrospinal meningitis or a meningococcemia and that the meningococcus is often present in the skin lesions. It is singular that these purpuric manifestations, which, as we have already pointed out, gave rise, originally, to the name of purpura, were to be described again nearly three hundred years later under the term of purpura fulminans.

CONTRIBUTIONS TO THE UNDERSTANDING OF PURPURA

Platelets: Throughout the nineteenth century the medical journals carried many reports on purpura and its varieties. Little progress was made in the understanding of this disease until Krauss[25] in 1883 and Denys[26] in 1887 pointed out that the hematoblasts were markedly diminished during the height of the purpura and increased when the hemorrhage ceased.

However, at that time, the existence of the platelets was in doubt. Donné[27] in 1844 was the first to find these elements in the blood; he called them globulins. Among the early writers who drew attention to the third corpuscle was William Osler,[28] who in 1874 noted their presence in the venules of recently killed young rats. Although a reduction of platelets in purpura had been pointed out by Krauss and Denys, an actual count was not made until 1890, when Hayem[29] was able to confirm Denys' findings. He counted the platelets in a young patient who had several attacks of purpura, and found but 89,000. At this time it was believed that the platelets were related to the red blood cells. Hayem called them the hematoblasts. To this day French hematologists call platelets by this name.

Clot Retraction. The name of Hayem is closely associated with another common finding in the blood of purpuric patients, namely, deficient clot retractility. This fluidity of the blood had been noticed by other writers, who commented on the absence of rigor mortis in purpuric cases.[30] We have seen that La Rivière spoke about "the watry thinness of the blood" when the purple spots were present. Duncan[31] in 1822, reporting his observations in a case of purpura, related "that the blood coagulated very slowly and the coagulum was not very firm; the serum did not separate and the coagulum had the appearance of shaking jelly." Hayem stated that not only was the blood clot of patients with purpura very slow in retracting, but that that phenomenon was in direct proportion to the number of platelets in the blood.[32]

In the latter half of the nineteenth century there was a tendency to place all types of mucous membrane bleeding under the heading of hemophilia. In 1885 Sir William Osler wrote the section on diseases of the blood in Pepper's "System of Medicine,"[33] devoting many pages to hemophilia and stating, in a few lines, that purpura was a disease to be differentiated from hemophilia. It was not until 1910, when Duke[34] discovered the difference between the bleeding time and the clotting time that much attention was directed to the differentiation between these two conditions.

Bleeding Time. The phenomenon of prolonged skin bleeding had been noted by writers before the time of Duke. Stoker[35] in 1823 performed several experiments to determine the coagulation time and what he called the "flowing time" of the blood in various conditions. He found the former to be from nine to nineteen minutes and the latter from three to seven minutes. He says he made the orifices as uniform in size as possible but neglected to state where they were made. Henoch[36] observed that in cases of purpura, pricking of the skin was followed by prolonged and free bleeding. Other writers have remarked on the difficulty experienced in checking the bleeding after venesection. Of course, venesection in those days was more than a simple needle puncture. Percival[37] tells in his Essays of a girl with purpura from whose arm "an apothecary took a little blood. From the orifice blood continually oozed for several days."

Capillary Resistance Test. Another useful method in the diagnosis of purpura is the capillary resistance test. Sir John Pringle[38] notes, in his "Observations on Diseases of the Army," that in hospital fevers petechiae appeared below the applied tourniquet during or after venesection. This test for capillary permeability has been pointed out by several authors as being associated with purpuric disease. In France it is called "le signe du Lacet" and was first described by Weill[39] in 1911. In Italy it is called the "Grocco-Frugoni's sign."[40] In Germany it is known by the name "Rumpel-Leede phenomenon"[41] and in America as the capillary resistance test of Hess.[42] Of all these workers Frugoni was undoubtedly the first to describe the test. He made a deliberate and thorough study of it in the several types of purpura and reported his results at length. Weill's description followed shortly. Leede wrote of this phenomenon primarily in relation to scarlet fever and Hess to scurvy. It is interesting to note that all three European contributions appeared in the first half of 1911.

EXPERIMENTAL PURPURA

One of the first records of experimental production of purpura is found in the work of Magendie,[43] who produced blood extravasations after introducing putrefactive matter intravenously. From this he concluded that purpura is due to the poisoning of the blood by some morbid principle still little known. In 1907 Cole[44] made an important experimental contribution when he demonstrated that a serum specific against human platelets could be prepared in an animal by injecting it with emulsions of human blood platelets. Eleven years later a condition essentially typical of the acute form of purpura hemorrhagica was produced in guinea pigs by Lee and Robertson,[45] after injection of the anti-platelet serum.

PROGRESS IN TREATMENT

Venesection: From Werlhof's notes it is surmised that venesection was resorted to as a means of treatment in purpura. La Rivière, himself, was undecided as to its advantages and wrote: "And there is a great controversie whether when purple spots and wheales appear phlebotomy is to be used. For some account it to be a heinous crime to let blood when the exanthemata appeared."[46] Werlhof[47] writes that other authors who mention this condition advised strongly against bloodletting. Even in 1830 we meet with several reports in the literature of good results following venesection. From the description of the symptoms, one may conclude that the condition was purpura. Nicoll[48] thought bleeding indicated when the purpura was due to "increased impetus of the blood." Harty,[49] after reporting recoveries in three cases which he bled, established the indications for venesection as follows:

> The florid appearance of the petechia in the two instances in which I found the venesection so necessary would seem to indicate that this colour is in some

degree characteristic of the species of purpura which admits of blood-letting. The great difference between these cases consists in the great strength and firmness of pulse in the latter and the more plethoric or inflammatory state of the system.

A few years later Mentzler[50] published a thesis entitled "The Use and Abuse of Venesection in Purpura."

Acids and Purgatives. Many other forms of treatment are suggested. Werlhof[47] himself advised giving sulphuric acid in the form of acidum Halleri, considering it as a specific. Purgatives were held for many years as a treatment of choice for purpura. The medical literature of the early part of the nineteenth century has many articles extolling their value.

Ergotin and the oil of turpentine had, in turn, their strong advocates.

Iron Chloride. The treatment of purpura by the perchloride of iron, offered by Pize[51] in 1857 created a great deal of controversy. Discussion reached such a stage that the Paris Academy of Medicine delegated a committee to study the matter. This committee submitted on the whole a favorable report.[52] There were heated debates in the Academy on the question of priority and many accusations and bitter words were passed. The treatment became, however, very popular with the profession, if one may judge by the hundreds of reports in the medical literature of the time. Some of these authors claimed for the compound almost miraculous qualities. After other remedies had been tried and had failed, the administration of one gram of perchloride of iron in critically ill patients was reported to be followed by a cessation of all bleeding.

This method of treatment was not new, for we find in Willan's text in 1808 that he advised the use of muriate of iron in the treatment of purpura. The same author wrote that in this condition "treatment is simple and may be comprised in a very few words; a generous diet, the use of wine, Peruvian bark and acids," adding further that "without air, exercise and an easy state of mind, the effect of medicines is very uncertain."

Blood Transfusion. It was inevitable that blood transfusion would sooner or later be resorted to in the treatment of this disease. The earliest record is to be found in the *Lancet*, 1873.[53] Defibrinated blood was used, but the patient died soon after the transfusion. The following year Dr. T. G. Morton[54] of Philadelphia reported a case of severe purpura hemorrhagica which he treated by the administration of 2 ounces of defibrinated blood. The patient, a child, improved immediately and eventually recovered. Several authors subsequently recorded success with transfusion.

Surgery. Purpura began to be approached from a surgical standpoint about the second decade of the current century.

Not an uncommon surgical procedure at this time was hysterectomy, in an attempt to control the uterine bleeding so common in females with purpuric manifestations.[55]

The spleen and liver had early been blamed for the production of this condition. Speaking of large and frequent nasal hemorrhages, Morgagni[56] says that they were often complicated by visceral disease, especially of the liver and spleen. Long before him, Hippocrates, Celsus and La Rivière had drawn attention to the relationship between an enlarged, diseased spleen and hemorrhages. Coelius Aurelianus[57] writes that "Some had directed the spleen to be cut out when it is much diseased," but he holds the proposal lightly and believes that the operation had never been performed. Stoker[58] in 1824 reported finding a very large spleen in an autopsy of a case of purpura hemorrhagica.

Splenectomy. Splenectomy, as a form of treatment, was first suggested in 1916 by Kasnelson,[59] when a medical student in the University of Prague, reasoning from the assumption that the spleen destroyed blood platelets and was thus responsible for their very low number in the blood. Professor Schloffer followed his suggestion and removed the spleen from a woman patient whose platelets were but two hundred. Following the operation, improvement was marked, the hemorrhages ceased and the platelets rose to 500,000. In February of 1917 Hess,[60] without the knowledge of the observation of Kasnelson, having noted that splenectomy, both in men and animals, is followed by an increase in blood platelets, stated: "It would seem worthy of a trial to perform a splenectomy, immediately preceded by blood transfusion, in cases of purpura where medicinal measures and repeated blood transfusions have been resorted to in vain."

HISTORICAL SUMMARY

We note that the history of purpura has, in a general way, passed through three distinct phases.

The first phase might be said to include the years before Lusitanus and La Rivière, when purpuric manifestations were invariably described in association with pestilential fevers. Lusitanus' and La Rivière's writings brought attention to purpura as a separate entity and inaugurated the second phase in the development of the conception of purpura. Repeated attempts were then made to separate it into different types. Willan's, Werlhof's, Henoch's and Schönlein's writings were directed towards the establishment of further subdivisions. Little was known, however, as to the underlying cause of these manifestations. With the discovery of the reduction in the number of platelets in purpura by Krauss and Denys, the third phase in its development is established. This discovery was followed in subsequent years by the contributions of Hayem, Cole, Duke, Kasnelson and others, yielding, with the aid of the laboratory, a better orientation in the understanding of this condition.

REFERENCES

1. For a complete discussion of the origin of the word Purpura consult: DEDEKIND, A. L'étymologie du mot pourpre expliquée par les sciences naturelles. *Arch. de zool. experim. et génerale hist. natur.*, Paris, 4: 1, 481, 1896.
2. PORCHON, A. Nouveau traité du pourpre, de la rougeôle et petite vérole, de leur nature et de leur remèdes. Paris, 1688.
3. DE GALTIER, L. Enchiridion therapeutique et prophylactique pourpre; ou manuel contenant briefue et methodique manière de traiter et guarir la maladie epidemique ou populaire, appellée vulgairement le pourpre ou le tacq avec le moyen de s'en preserver. Paris, 1645.
4. WILLAN, R. On Cutaneous Diseases. London, 1808, p. 452.
5. BAUER, G. G. De purpura hemorrhagica. Halae, 1824.
6. HIPPOCRATES. De intern. affectionibus. Sect. v, p. 558.
7. COXE, J. REDMAN, The Writings of Hippocrates and Galen. Phila., 1846.
8. AETIUS AMIDENUS. Aetii medici Graeci contractae ex veteribus medicinal tetrabiblos. Froben, 1549. Tetr. 2, Sermo 1, cap. 129, p. 256.

9. Lucan. Pharsalia. Translated into Engl. by N. Rowe (Vol. 29 of the "Works of English Poets" by Samuel Johnson, London, 1790) Book IX, ver. 1364.
10. Rhazes. Treatise on the Small-pox and Measles. Transl. by Rich. Mead. London, 1748.
11. Adams, F. The Seven Books of Paulus Aegineta. London, 1846, vol. 2, p. 39.
12. Fracastorius, H. De Morb, contagiosis. Lib. II, cap. 6. Opera Omnia. Venetiis, 1555, p. 119.
13. Amatus Lusitanus. Curationum medicinalum Centuriae quatuor. Basileae, 1556. Cent. III, Curat. 70, p. 286.
14. Eugalenus, Severus. De morbo scorbuto liber. Hagae, 1658. Obs. 2, 62, 68.
15. Rivierius, Laz. Praxis medica or the Compleat Practice of Physick. All Englished by Nicholas Culpepper. London, 1658, p. 618.
16. Riverius, Laz. *Op. cit.*,[15] p. 620.
17. Hornung, A. L. F. De purpura sive febre miliari. Jenae, 1734.
18. Werlhof, P. G. Opera medica. Ed. by J. E. Wichmann, 1775, p. 748.
19. Behrens, R. A. Epistolica dissertatio . . . de morbo maculoso hemorrhagico. Brunsvigae, 1735. In Wichmann's ed. of Werlhof's Opera medica, p. 615.
20. Stieldorf, H. Sur le purpura hemorrhagique. Thèse de Strasbourg, 1864.
21. Raymann, J. A. Petechiarum mendacium historia, earumque a sinceris differentia. *Acta Acad. Nat. Curios.*, Norimb., 9: 87, 1752.
22. Schönlein, J. L. Allegemeine und specielle Pathologie und Therapie. St. Gallen, 1837, vol. 2, p. 42.
23. Henoch, E. Zusammenhang von Purpura und Intestinalstorungen. *Berl. klin. Wchnschr.*, 5: 517, 1868. Ueber eine eigenthumliche Form von Purpura. *Ibid.*, 11: 641, 1874.
24. Henoch, E. Ueber purpura fulminans. *Berl. klin. Wchnschr.*, 24: 8, 1887.
25. Krauss, E. Ueber Purpura: Inaug. Dissert., Heidelberg, 1883.
26. Denys, J. Études sur la coagulation du sang. *La cellule*, 3: 445, 1887.
27. Donné, A. Cours de microscopie. Paris, 1844, p. 85.
28. Osler, W. An account of certain organisms occurring in liquor sanguinis. *Proc. Roy. Soc. Med., London*, 22: 391, 1874.
29. Hayem, G. Du purpura. *Presse med.*, 2: 233, 1895.
30. Genest, Quoted by H. Stieldorf: *Op. cit.*,[20] p. 10.
31. Duncan, A., Jr. A case of purpura hemorrhagica. *Edinb. M. & S. J.*, 18: 405, 1822.
32. Hayem, G. Du caillot non-retractile. *Compt.* rend. *Acad. d. sc.*, Paris, 123: 894, 1896.
33. Pepper, W. A System of Practical Medicine. Vol. 3, Phila., 1885, p. 931.
34. Duke, W. W. The relation of blood platelets to hemorrhagic disease. Description of a method for determining the bleeding time and the coagulation time. *J. A. M. A.*, 55: 1185, 1910.
35. Stoker, Wm. Pathological Observations on Dropsy, Purpura and the Influenza and on the Morbid Changes in the Blood. Dublin, 1823, p. 45.
36. Henoch, E. Lectures on the Diseases of Children. N. Y., 1882, p. 315.
37. Percival, Thos. Essays Medical and Experimental. London, 1773, vol. 2, p. 118.
38. Pringle, Sir J. Observations on the Diseases of the Army. Ed. by Benj. Rush, Phila., 1810, p. 261.
39. Weill, E. Purpura provoqué par hypertension veineuse. *Lyon med.*, 116: 936, 1911.
40. Frugoni, C., Giugni, F. Le signe du Lacet dans les maladies à manifestations hemorrhagiques. *Semaine med.*, 31: 25, 1911.
41. Leede, C. Hautblutungen durch Stauung hervorgerufen als diagnostisches Hilfsmittel beim Scharlach. *München. med. Wchnschr.*, 58: 293, 1911.
42. Hess, A. F. Infantile scurvy: the blood, the blood vessels and the diet. *Am. J. Dis. Children*, 8: 385, 1914.
43. Magendie, F. Précis élementaire de physiologie. Ed. 3, Paris, 1833, vol. 2, p. 417.
44. Cole, R. I. Note on the production of an agglutin. serum for blood platelets. *Bull. Johns Hopkins Hosp.*, 18: 261, 1907.
45. Lee, R. I., and Robertson, O. H. The effect of anti-platelet serum on the blood platelets and the experimental production of purpura. *J. Med. Research*, 33: 323, 1916.
46. Riverius, Laz. *Op. cit.*,[15] p. 625.

47. Werlhof, P. G. *Op. cit.*,[18] p. 749.

48. Nicoll, W. Observations on the treatment of purpura hemorrhagica. *Edinb. M. & S. J.*, 18: 540, 1822.

49. Harty, W. On the efficacy of mercurial purgatives in purpura, whether simple or hemorrhagic; and on the circumstances that justify blood-letting in these diseases. *Edinb. M. & S. J.*, 34: 57, 1830.

50. Mentzler, F. J. De venaesectionis in purpura abusu et usu. Argentorati, 1844.

51. Pize. Emploi du perchlorure de fer dans le traitement du purpura. *Moniteur d. Hôp.*, vol. 5, 1857.

52. Pize. Le perchlorure de fer dans le traitement du purpura. *Bull. de l'acad. de méd. de Par.*, 25: 686, 1859–1860.

53. Smith, T. Transfusion of blood in a case of purpura. *Lancet*, 1: 837, 1873.

54. Morton, T. G. On transfusion of blood. *Am. J. M. Sc.*, 35: 116, 1874.

55. Minot, G. R. Studies on a case of purpura hemorrhagica. *Am. J. M. Sc.*, 152: 48, 1916.

56. Morgagni, J. B. The Seats and Causes of Diseases. Transl. by W. Cooke. N. Y., 1822, vol. 1, p. 182.

57. Adams, F. *Op. cit.*,[11] vol. 1, p. 579.

58. Stoker, Wm. *Op. cit.*,[35] p. 146.

59. Kasnelson, P. Verschwinden der hamorrhagischen Diathese bei einem Falle von essentieller Thrombopenie (Frank) nach Milzextirpation. Splenogene thrombolytische Purpura. *Wien. klin. Wchnschr.*, 24: 1451, 1916.

60. Hess, A. F. A consideration of the reduction of the blood platelets in purpura. *Proc. Soc. Exper. Biol. & Med.*, N. Y., 14: 96, 1917.

GOETHE AND HIS THEORY OF COLORS*

By BURTON CHANCE, M.D.

PHILADELPHIA

FROM the earliest times mankind has been attracted by the colors visible to the eye and has sought to solve the mysteries of their appreciation. Artists and artificers have been perplexed by the diverse effects produced when they mixed their pigments, and when spread upon their materials; and how the effects have varied when subjected to solar and to artificial illumination. Since classical days and onward throughout the advances made by Science, during modern times, philosophers promulgated "theory" after "theory," each theory conflicting with the other and, not seldom, arousing singular hostility and impatience in their advocates. Accordingly, from time immemorial it has been hazardous for observers to attempt to treat of "Color." So usual has it been for this difference of opinion to be excited, that one observer was led to utter, "the ox becomes furious if a red cloth is shown to him; but the philosopher, who speaks of color only in a general way, begins to rave." In the fourth century B.C., Aristotle sought to describe and classify the phenomena, and Boyle also, in the seventeenth century of our era. At the dawn of the nineteenth century, the principles concerning the origin of color enunciated by Newton in the latter half of the seventeenth century were believed in by all, when, to the astonishment of the world, von Goethe, poet and philosopher, assailed those principles and excited a controversy which raged violently in certain quarters for seventy-five years!

Goethe had not been known as a scientist. It was true he had sketched an "Introduction to Comparative Anatomy," and had made discoveries in the transformation of the parts of plants from stem to fruit, which led him to write an exquisite treatise on the "Metamorphoses of Plants," and he had published "Contributions to Physical Optics"; yet, because it was known that he lacked training in scientific methods of observation, he was deemed to be incompetent to deal with so complicated a subject as a "Theory of Colors." The very title "Contribution to Optics" excited the disapprobation of professional students.

Let us glance at the status of the subject prior to Goethe's time; for a better understanding of principles which Goethe assailed it seems necessary that our memory should be refreshed by a somewhat extended account. Before Newton only vague hypotheses had been assumed. Aristotle believed that color is a mixture of white and black, though he was undecided how the mixture was effected; he supposed that darkness must be due to the reflection from bodies, because, as light is reflected from one surface to another in a series it becomes fainter. In 1666, in his darkened room at Trinity College, Cambridge, Newton observed, when he caught a beam of sunlight on the surface of a prism, that the light in passing through the prism was deflected and there was cast on the whitewashed wall a reflection of the colors red, orange, yellow, green, blue, and violet in sequence, together with intermediate tints from the blending of the distinct colors adjacent to one another. White light, therefore, he declared, is a mixture of all the colors in certain definite proportions. Conversely, also, there exist different kinds of light, or differently colored lights; these, when mixed, produce "derived colors," which to a certain extent form new colors resembling the original ones from which they were derived. So, too, "primitive colors" can be reproduced from derived colors, as well as from white, but these are incapable of further analysis or change. When light falls upon transparent and on opaque bodies the surfaces of the bodies appear to be colored because the reflection destroys some of the constituents of the light; there are then reflected back to the eye the remaining constituents but these are no longer mixed in the proportions necessary to produce white light. Thus, a piece of red glass looks red because it transmits only red rays. Consequently, all color is derived from a change in the proportions in which the ingredients of light are mixed; therefore, color is a property of light and not of the colored bodies, which only, it may be said, furnish an occasion for its manifestation.

---

* Read at the Meeting of the Section on Medical History, College of Physicians, Philadelphia, April 11, 1932.

The heterogeneous nature of white light was definitely proved by Newton, who found also that lights of different colors have different refrangibilities; and, as already stated, colors of natural bodies depend upon the peculiarities of absorption and reflection. He observed that when a point of light passed through a prism it was deflected into an angle with its original direction; it became, as we say, refracted. The rays of the different colors were refracted differently as, after passing through the prism, they separated from each other, and pursued different courses, forming the so-called "prismatic spectrum," the colors being arranged in the order already named. When, however, one looks at a broad luminous surface, the spectra of the points near the middle of the surface are superimposed in such proportions as to yield white light but at the edges certain colors are set free. Just as in the case of the luminous point, the white surface appears displaced, but, instead of being colored throughout, it has on one side a margin of blue and violet, on the other a margin of red and yellow. A black patch between two bright surfaces may be entirely covered by such colored margins, and, when these meet in the middle, the red of the one and the violet of the other combine to form purple. The colors, into which, at first sight, it seems as though the black has been decomposed, are due in reality not to the black strip, but to the white on each side of it. Newton incidentally explained that the colors of the rays of light depend entirely upon the result of the action of the rays upon the retina; accordingly rays themselves are not red, nor some other color, but they produce the sensation of the color.

Newton's theory of colors is really less a theory than a direct presentation of facts; not only was he able to decompose white light into the several refrangible rays, but he could recompose readily the identical colors into white light. Therefore, the analysis and synthesis are matters of fact. Nevertheless, Sir David Brewster, the eminent Scottish natural philosopher, opposed Newton's inference that the colors of the rays depend on their refrangibility; that light of a given refrangibility is homogeneous in all other ways, and, therefore, is invariable in color. It was Brewster who invented the kaleidoscope; developed the stereoscope; besides having made discoveries in optics, including the polarization of light and "fringes of color." He lived from 1781 to 1868; to the end he maintained a theory of his own concerning the three primary colors.

Goethe, from his youth upwards, was given to theorizing on painting, notwithstanding his admitted lack of a talent for painting; as concerning poetry, he pointedly declared, it was not necessary for him to theorize because he held within himself the creative power. In painting he wished by reason and insight to fill up the deficiencies of Nature. Science, also, had continued to interest him profoundly, ever since his journey to Italy. During his travels, 1786–1788, he became consciously aware of the beauties of the skies and the sunshine to which he hitherto had been unmindful, and he observed earnestly the paintings of the Old Masters in the galleries. In his mind there culminated that project with which he had been occupied for a period of twenty years or more: a study of "color" as presented in Nature and in Art. From this time onwards his studies in optics, by which he hoped to disprove Newton's "theory of colors," became the great affair of his life, although, singularly, instead of trying to solve the artist's "problem," he strove to solve the scientist's.

The story of how he became interested in the study of color he "confesses" in a chapter in the "Farbenlehre." At the University he had been taught the physical theory of colors, although he could not harmonize in his own mind those principles with his appreciation of the aesthetic effects of color to which he was most sensitive; he therefore determined to repeat for himself the experiments he had witnessed at the hands of others. He borrowed a prism from Hofrath Bütter, of Jena, yet, because of other occupations, he was prevented from carrying out his plan and the prism was kept for a long time unused. After a time the owner sent for the prism by a messenger who had been ordered to bring it back directly. Goethe took it out of the case and thought he would have one more peep through it. To make certain of seeing something, he turned it towards a long white wall, under the impression that he should see a brilliant example of the solution of light into different colors. He was disappointed as he saw no colors on the expanse of the white wall; but they appeared where it was bounded by the darker window frame. Accordingly, he made the observation that color can be seen through a prism only where a dark object and a bright one have the same boundary line. Struck by this observation, which was quite new to him, and, assuming that it was irreconcilable with Newton's theory, he induced the owner to let him have the prism for a little while longer. Henceforth, he devoted himself to the question with the utmost zeal and interest; he prepared sheets of paper with black and white spaces and studied the phenomenon under every variety of condition, until he thought he had sufficiently proved his findings. He next attempted to explain to a neighbor, who was a physicist, his supposed discovery but was disagreeably astonished when he was assured by him that the experiments were well known and fully accounted for in Newton's theory. Every other natural philosopher to whom he applied told him exactly the same. He returned, and studied Newton's writings, fancying he had found in them some fallacies which accounted for the error.

Goethe's labors in this domain fall into two divisions, one, in which he tries to prove that the hypotheses of Newton are unsatisfactory, and another, in which he develops a "theory" of his own. In 1791 and 1792, he published two short essays in which he described with great accuracy and liveliness the experiments he had made. These consisted chiefly of the appearances presented by white discs on a black ground, black discs on a white ground, and colored discs on a black or white ground when seen through a prism. He noted that the center of a broad white surface remained white when seen through a prism, and that a black streak on a white ground could be decomposed entirely into colors. These two points he considered fatal to Newton's theory.

The scientific friends to whom Goethe communicated these observations assured him there was nothing in them opposed to Newton's theory, indeed, they were but confirmations of it. It is evident that Goethe did not recollect Newton's theory well enough to enable him to find out the physical explanation of the facts, neither would he be convinced of his error, yet he took no pains to acquire that exact knowledge of mathematics and geometrical reasoning without which the more abstruse problems of physical optics cannot become intelligible. His philosophical friends repeatedly laid the theorems before him, in a thoroughly intelligible manner, as he assured them several times, thus indicating that he comprehended the principles quite correctly, yet he obstinately persisted in his assertion that the facts as he cited them were, to anyone who might observe them, sufficiently apparent and convincing of the absolute incorrectness of Newton's theory. "Goethe once confessed in his old age that he had never opened a book without imagining before he read one page that he knew it better than the author."

He went further and formulated a theory of his own. His views on the subject are contained in their shortest form in a letter addressed to Jacobi from the camp at Marienburg in July, 1793. They are divided into six heads, of which the following is an abstract: (1) Light is the simplest matter of which we have knowledge, the least capable of analysis, the most homogeneous. It is not a compound body, (2) least of all is it compounded of colored lights. Every colored light is darker than colorless light. Brightness cannot be compounded of darkness. (3) Inflexion, refraction, reflection, are three conditions under which we often observe apparent colors, but they are the occasions for their appearance rather than the cause of it. (4) There are only two pure colors, blue and yellow; red may be regarded as a property of both of these. There are two mixed colors, green and purple; the rest are gradations of these colors, and are not pure. (5) Colorless light cannot be produced out of colored lights, nor white from colored pigments. (6) The colors apparent to us arise solely out of a modification of the light. The colors are excited in the light, not developed out of the light. In Goethe's opinion, yellow was light seen through a thickened medium; colors were derived from these two. These views, slightly modified, he afterwards extended and explained.

In 1810, when he was sixty-one years of age, Goethe issued his great work, "Zur Farbenlehre," based upon a well-arranged mass of observations and experiments. It is in two volumes, 8 vo. of 1510 pages, with 16 colored plates in 4to. The greater part of the first volume is taken up with Goethe's experiments which are described in 920 paragraphs, duly numbered. There is no consecutive argument, the paragraphs are like a variety of chain-links scattered about on a workbench. The exposition is subdivided into "didactic" and "polemical" parts. In the "didactic" the author professes to consider colors with respect to the physiological, their physical and their chemical properties.

The main divisions are subdivided into short sections, bearing titles more or less shadowy, from a scientific point of view: Origin of White; Origin of Black; Excitement of Color; Heightening; Culmination; Balancing; Reversion; Fixation; Mixture Real; Mixture Apparent; Communication Actual; Communication Apparent. He describes the colors of minerals, plants, worms, insects, fishes, birds, mammals and men. Hair on the surface of the human body he considers indicative of weakness rather than of strength. The disquisition is continued under the headings: How Easily Color Arises; How Energetic Color may Be; Heightening to Red; Completeness of Manifold Phenomena; Agreement of Complete Phenomena; How Easily Color Disappears; How Durable Color Remains; Relation to Philosophy; Relation to Mathematics; Relation to Physiology and Pathology; Relation to Natural History; Relation to General Physics; Relation to Tones. Then follows a series of sections relating less to Science than to Art, dealing with the primary colors and their mixtures; among which are: Of Aesthetic Effects; Fear of the Theoretical; Grounds and Pigments; Allegorical, Symbolical, and Mystical Use of Colors. The headings alone indicate the enormous industry of the poet; showing at the same time an absence of that scientific definiteness which he stigmatized as "pedantry" in the case of Newton. (Tyndall.)

The author asserts that colors are the joint production of light and of the substance exposed to it, an effect of the modification of light, produced by partial darkness; a modification which he says has been overlooked by the authors of the received theories.

The "polemical" part, which follows the didactic, is a minute and detailed examination and discussion of the optics of Newton, which Goethe considered as grossly deficient in satisfactory demonstration and wholly inadequate to prove the compound nature of white light.

Throughout the first 352 pages of his work, wherein he develops and expounds his own theory, Goethe restrains himself with dignity. Some of the titles to paragraphs and sections might have a meaning to the poet but to most of us I fear they would be incomprehensible.

Physical colors he thought little more real than physiological colors, often merely apparent and transitory. He divided them into *dioptrics*, either by simple transmission or by refraction; *paroptics* sometimes called colors by inflection or diffraction; and *epoptics*, or depending on the properties of surfaces as the colors of thin plates. Chemical colors, he observed, are the most permanent, and these are the chemical effects of different colors as nearly related to the subject, together with the chemical properties connected with dyeing and bleaching. The other divisions of this part contain a connected sketch of the doctrine of colors; a discussion of the relation of chromatics to other departments of science and an examination of the effects of colors, with regard to the fine arts.

The remainder of the work concerns the problems connected with the use of pigments by the artist, which aspect of the subject I am incompetent to discuss; moreover, this phase is not within the province of our outlook as medical men, and I shall not attempt to present his treatment of it.

As far as the observations of the reactions which he had noted, in what, today, would be counted as physiological and pathological, we must bear in mind that the minute structure of the human eye had not yet been studied; the ocular fundus had not yet been seen; the function of the retina not understood; indeed, the terms in actual use by physiologists and anatomists at the end of the eighteenth century are to us not a little confusing. The physiology of the sense perceptions was at that time not well defined. Light sense, contrast, after-images, and other phenomena have a different meaning to us than their observation by Goethe indicated to him.

Goethe cites as a morbid condition that incapacity of perceiving blue light, presumably a variety of color blindness, which affection had been adequately defined by Dalton about 1790 but of which Goethe seems not to have been aware. He describes this defect of color-vision in the following manner, quoting from Eastlake:

> We will here first advert to a very remarkable state in which the vision of many persons is found to be. As it presents a deviation from the ordinary mode of seeing colours, it might be fairly classed under morbid impressions; but as it is consistent in itself, as it often occurs, may extend to several members of a family, and probably does not admit of cure, we may consider it as bordering only on the nosological cases.
>
> I was acquainted with two individuals not more than twenty years of age, who were thus affected: both had bluish-gray eyes, an acute sight for near and distant objects, by day-light and candle-light, and their mode of seeing colours was in the main quite similar.
>
> They agreed with the rest of the world in denominating white, black, and grey in the usual manner. Both saw white untinged with any hue. One saw a somewhat brownish appearance in black, and in grey a somewhat reddish tinge. In general they appeared to have a very delicate perception of the gradations of light and dark.
>
> They appeared to see (following the author's nomenclature) yellow, red-yellow, and yellow-red, like others; in the last case they said they saw the yellow passing as it were over the red as if glazed: some thickly-ground carmine, which had dried in a saucer, they called red.
>
> But now a striking difference presented itself. If the carmine was passed thinly over the white saucer, they would com-

pare the light colour thus produced to the colour of the sky, and call it blue. If a rose was shown them beside it, they would, in like manner, call it blue; and in all the trials which were made, it appeared that they could not distinguish light blue from rose-colour. They confounded rose-colour, blue, and violet on all occasions: these colours only appeared to them to be distinguished from each other by delicate shades of lighter, darker, intenser, or fainter appearance.

Again they could not distinguish green from dark orange, nor, more especially, from a red brown.

If any one, accidentally conversing with these individuals, happened to question them about surrounding objects, their answers occasioned the greatest perplexity, and the interrogator began to fancy his own wits were out of order. With some method we may, however, approach to a nearer knowledge of the law of this deviation from the general law.

These persons, as may be gathered from what has been stated, saw fewer colours than other people; hence arose the confusion of different colours. They called the sky rose-colour, and the rose blue, or vice-versa. The question now is; did they see both blue or both rose-colour? did they see green orange, or orange green?

This singular enigma appears to solve itself, if we assume that they saw no blue, but instead of it, a light pure red, a rose-colour. We can comprehend what would be the result of this by means of the chromatic diagram.

If we take away blue from the chromatic circle we shall miss violet and green as well. Pure red occupies the place of blue and violet, and in again mixing with yellow the red produces orange where green should be.

Professing to be satisfied with this mode of explanation, we have named this remarkable deviation from ordinary vision, "Acyanoblepsia," non-perception of blue.

The second volume of the work is occupied principally by an historical abstract, chaotically arranged, of the discussions and opinions of all philosophers, ancient and modern, respecting light and colors, and exhibits Goethe's extraordinary industry. Throughout, he sought to combat the Newtonian doctrines, maintaining that Newton was mistaken with respect to light. He details his own experiments with the prism in which he was not able to obtain the reflection of colors as Newton so readily did, when a beam of light in a darkened room passed through a prism. He accordingly declared the Newtonian doctrine false. Farther on he charges Newton with moral obliquity and obstinacy in carrying forward his solution of the problem.

This, briefly, is a sketch of the plan and contents of that work which caused the greatest and most acrimonious criticism of any work published in the field of science, in the early part of the first half of the nineteenth century. The controversy agitated by Goethe over his so-called theories, which in truth are not principles of natural philosophy at all, quite parallels that carried on for the greater part of the second half of the seventeenth century, over philosophical, political and mathematical ideas, by Hobbes, the author of "Leviathan," the friend of Bacon, Galileo and Harvey, and with Boyle, Wallis, Ward and others.

The von Goethe controversy quieted down only to be revived with even greater vigor after his death by the publication in 1840 of an English translation of "The Theory of Colors with Notes," by Charles Locke Eastlake, R.A., F.R.S. The original work was divided into three parts, "Didactic," "Controversial" and "Historical," but Mr. Eastlake translated admirably only the first of these portions and with some extracts from the other two, such as seemed to the editor, in fairness to the author, necessary to explain some of his statements.

Eastlake's volume is divided into six parts: (1) Physiological and Pathological Colors; (2) Physical Colors; (3) Chemical Colors; (4) General Characteristics; (5) Relation to Other Pursuits; (6) Effects of Color, with Reference to Moral Association, and the doctrines expounded under these heads are illustrated where necessary, with colored diagrams which occupy four plates. The translator's notes are written with modesty and good taste by that accomplished writer, their object being to point out the connection between the theory of Goethe and the practice of Italian painters.

It may be well for us to review the main points of the controversy and to repeat in part what was uttered in condemnation of the Theory of Colors. The literature relating to this incident in the history of Science is so vast that it would be impossible to prepare a brief summary of the complete output of it. I can give but a modicum of it, and what studies I have made have not gone beyond 1880.

Hermann Grimm declared:

> Considered as a book, as a product of words and thoughts, the Theory of Color is truly enchanting. What it contains in historical material alone is sufficient warrant for what I have said of it. According to Goethe's principle, that in order to present Science one must give the history of this Science, Goethe while discussing what the learned as well as amateurs have said about colors in different ages, produced a book which no one can ever tire of reading who has once become acquainted with it.

And, yet, the work aroused the greatest excitement, and the distrust of physicists and physiologists. One critic, presumably Lord Brougham, in his formal review of "Zur Farbenlehre," in the *Quarterly Review* for January, 1814, stated that his

> . . . intention has been less directed to the work by the hopes of acquiring from it anything like information, than by a curiosity to contemplate a striking example of the perversion of the human faculties, in an individual who, for the space of twenty years had wasted his powers by forcing them into a direction in which he had mistaken his way for the want of a judicious guide.

In an extensive criticism, he outlined the arrangement of the book but viewed the work as a case of "hallucination." He gives in detail the "Confession" wherein Goethe described the origin of his studies, which "confession" the reviewer regards as "the most prominent feature of the malady." Goethe wrote:

> Having no experience in such matters, and not knowing the direction I ought to take, I addressed myself to a Physicist of repute, begging him to verify the results I had arrived at. I had already told him of my doubts of the Newtonian hypothesis, and hoped to see him at once share my convictions. But how great was my surprise when he assured me that the phenomenon I spoke of was already known, and perfectly explained by the Newtonian theory. In vain I protested and combated his arguments. He held solidly to the credo, and told me to repeat my experiments in a "camera obscura."

Goethe endeavored to formulate the conditions of the production of colors.

He tried to uphold the old views of Aristotle, that color is a mixture of black and white, and that darkness is by reflection. Colors, he stated, are manifested in some original phenomenon; the colors of "cloudy media" being that original phenomenon. Many media of this sort give a red color to light, as the sun near the horizon, that passes through them, whereas the incident light as seen against a dark background looks blue, as does the sky when the sun is in the zenith. Thus, following Aristotle's view, he supposed that, to produce colors, light must be darkened; or, has to be mixed with darkness. Darkness, therefore, according to Goethe's reasoning, has as much to do as light with the production of color. Color is really due to the commingling of both. He imagined that in the phenomena of cloudy media he had discovered the special kind of darkening that produces, not what we call grey, but colors as usually understood. He did not explain what change occurs in the light under these circumstances, although he did say that the cloudy medium gives the light something "corporeal," "shadowy," which is necessary for the production of color. Just what he meant by this is not clear. Helmholtz suggested that Goethe implied that "something corporeal escapes from bodies along with the light they emit." The question of boundaries between dark and bright spaces was of the greatest importance to the author of the "Farbenlehre"; his theory sought to account for the colored fringes produced at the edges of his refracted images.

All transparent bodies including prisms, Goethe continues, are a little cloudy, and the prism communicates something of its cloudiness to the image which the spectator beholds, that is, the image in a prism is never sharp, but confused and indistinct, and he classified such images with the secondary images produced by plane parallel glass plates and crystals of Iceland spar. When a bright surface on a dark background is viewed through a prism, his idea was that the image shifts and becomes clouded by the prism. The anterior edge of the bright area is shifted over the dark background, and, being a bright cloud over darkness, looks blue. But the other edge of the bright area, being overlapped by the cloudy image of the black background that succeeds it, is a bright thing behind a dark cloud, and is therefore yellow-red. He did not explain why the anterior edge appears in front of the background, and the other edge behind it, and not vice versa.

The experiments which Goethe used to support his theory of color are accurately observed and vividly described. The crucial experiments with homogeneous light which are the basis of Newton's theory he seems never to have repeated nor to have seen. Notwithstanding the idea that white light is composed of a multitude of differently refrangible rays, whose coalescence produces the impression of white, was known by everybody, the experiments made no appeal to Goethe, and he rejected with indignation the conclusions drawn from them.

In his "Farbenlehre," Goethe employed methods altogether foreign to those commonly used in physics or in the treatment of a purely physical theme. After expressing his own views, he then examines the works of Newton, going over the propositions in optics one by one, the individual words of the propositions becoming the objects of his criticism. He then attempts to analyze the personal character of Newton during which he leaves the paths of calm investigation and gives himself over to his emotions, and accuses Newton of misusing his (Newton's) method of exposition. "To support his unnatural theory," he declares, "Newton heaps experiment on experiment, fiction upon fiction, seeking to dazzle where he cannot convince."

Goethe, usually so temperate and courtier-like, passionately attacked that consummate master of the physical and astronomical sciences, and applied to Newton's propositions such expressions as, "mere twaddle"; "incredibly impudent"; "ludicrous explanation"; "admirable for school children in a go-cart"; "but I see nothing will do but lying, and plenty of it." And Newton himself was heaped with abuse, he is described as "rigid" or "obstinate," and "no better than a charlatan"; his theory of colors, "a petrified aperçu"; while he scornfully inveighs against Newton's "imitators," "the school which had long accustomed to support, patch up, and glue their intellects to the view of Newton, has surgeons on hand to embalm the corpse, so that even after death, in the manner of the Egyptians, it should preside at the banquets of the natural philosophers." He would not accept their contradiction as an endeavor to decide between Goethe and Newton, but only as a contemptuous assertion of a contradiction between "Goethe" and "Truth."

Throughout is invective which ill becomes him of whom Thomas Carlyle (and to Carlyle English readers are indebted for the introduction of Goethe), said:

> . . . considered for the last 100 years, by far the notablest of all Literary Men is Goethe. To that man too, in a strange way, there was given what we may call a life in the Divine Idea of the World; vision of the inward divine mystery; and strangely, out of his Books, the world rises imaged once more as godlike, the workmanship and temple of a God. Illuminated all, not in fierce impure fire splendor . . . but in mild celestial radiance;—to my mind, by far the greatest, though one of the quietest, among all the great things that have come to pass in them. Our chosen specimen of the Hero as Literary man would be this Goethe. . . . I consider him to be a true Hero; heroic in what he said and did, and perhaps still more in what he did not say and did not do; to me a noble spectacle: a great heroic ancient man, speaking and keeping silence as an ancient Hero, in the guise of a most modern, high bred, high cultivated Man of Letters! We have had no such spectacle; no man capable of affording such, for the last 150 years.
>
> Speak as I might, Goethe, to the great majority of you, would remain problematic, vague; no impression but a false one could be realized. Him we must leave to future times.

Goethe tried to get the French Academy to report on his work, but it was rejected. Cuvier declaring that it was not one to occupy the Academy. He therefore was grieved to find that the scientists refused to accept his conclusions, for he prized his studies in color above all his works. "In what I have done as a poet," he writes in a letter to Eckermann, "I take no pride, but I am proud of the fact that I am the only person in this century who is acquainted with the difficult science of Colors." He sought for companions in his pursuits but every one appeared to entertain an aversion for his labours, so that he found the whole world prepossessed with incredulity as to his capacity for such investigation. This aversion assumed more the form of displeasure, if not enmity, in proportion as the individual was the more learned and the better informed. Accordingly, he was not able to obtain the confidence of a single natural philosopher, although he did receive the warm praise of princes, anatomists, chemists, scholars and moralists, who believed he was going to dethrone Newton; to the poet Schiller he was particularly grateful for his encouragement, and, especially, to the then reigning Duchess Luisa, of Weimar, whose patronage enabled him to publish his work, and to whom he dedicated the "Farbenlehre." The Duke of Gotha placed at his disposal a magnificent laboratory; Prince August sent him splendid prisms from England. Helmholtz believed that the great sensation produced in Germany by "Zur Farbenlehre" was due in part to the fact that, most persons being unaccustomed to the accuracy of scientific investigation, they are naturally more disposed to follow a clear, artistic presentation of the subject than mere mathematical and physical abstractions.

Notwithstanding the fact that the Theory of Color was rejected and disregarded by most of his contemporaries, Goethe continued to advocate it to the end of his days; and he left it with sure confidence in the judgment of posterity. In Knight's "Gallery of Portraits," published in London in 1835, three years after Goethe's death, I found this statement:

> Whether, in the revolution of opinion, the bold polemical writings against the Newtonian theory of light and colors will ever be looked upon as more than extravagances of a great genius wandering out of his own sphere, time will show.

In his own day he had some adherents, the most distinguished perhaps was the philosopher Hegel. Goethe complained that no physicists believed in him. As that is still true, in an age which more than any other has been devoted to physical inquiries, we may conclude that the principles upon which his theories were based are radically wrong. In recording the fact that he could not count on one physicist, he does not seem to realize that their refusal was destructive to his pretensions. The work is now dead and its conclusions unknown to most of those who are working in the department of science in which it existed.

The experiments and observations he has recorded are astonishing in their variety and number. The amount of reading which he accomplished was indeed vast. A critic in the *Edinburgh Review* wondered why he had undertaken the task of an analysis of the "Farbenlehre," and inquired, "why did Goethe write such a book?" He declared, "it could not have been to widen the boundaries of optical knowledge, for Goethe had never been within sight of its frontiers. It certainly was not to obtain rank or wealth or office, nothing, unless it was that he coveted the diadem of Newton." The work, even in Eastlake's translation, is hard to read, and it is difficult to come to any conclusion regarding Goethe's real conceptions. They are beyond the understanding of most students of physics; meanwhile, many of his observations have become the implements of the experimental psychologists and the student of physiological optics, who, perhaps, without being aware of it, owe the bases of their own observations to the sage of Weimar.

When one tries to read Goethe's works, and the statements by his critics, it is difficult to realize that the principal contestant was a man of extraordinary abilities. It seems strange that he should have allowed himself to be wrought up into a state of mind which prevented his seeing clearly what could be seen by instructed school children. Into the controversy ranged the foremost physicists and philosophers of the succeeding fifty years, certain of whom were investigators of the highest grade in the science of Optics, and whose enunciations of the principles thereof were accepted by all scientific workers. Opposed to them was a man of remarkable mental endowments, who possessed the talent for seeing through whatever obscured reality, not only in poetry but in certain departments of natural science; who assures us that the physicists are wrong, declaring that he is so convinced of the correctness of his own view, that he cannot explain their contradiction except on the assumption of narrowness or malice on their part. And, further, he cannot help looking on his achievement in the theory of color as far more valuable than anything he had accomplished in poetry. (Helmholtz.)

We, with Helmholtz, may regard such an attitude as an index of some perversion or deep antagonism of principle; some difference of organization between his mind and theirs which prevented each from understanding the other. Charles Kingsley suggested that Goethe might have had a vague feeling that his conclusions were not sound and that he felt a jealousy incident to imperfect convictions. Helmholtz would have us conceive the grounds of this antagonism as depending upon the fact that Goethe was a poet, the materials of whose art become the direct vehicle of an idea, which idea he applies to the comprehension of whatever else he directs his mind. Hegel incorporated Goethe's theory of color in his system of philosophy; he, like Goethe, wished to see in natural phenomena the direct expression of certain preconceived ideas, rather than to search for the ultimate elements. This, in Helmholtz's opinion, is the explanation of Hegel's affinity with Goethe, and of his chief opposition to theoretical physics. The poet does not, as would the scientist, arrange the phenomena of nature under definite conceptions, but sits down to contemplate them as he would a work of art, complete in itself, which conception would be certain to yield up its central idea, sooner or later, to a susceptible student. Goethe believed that Nature has no secrets from the attentive observer; accordingly, he was opposed to experimental research, and he would have us believe that Nature resists the interference of the experimenter who tortures her and disturbs her. He rebelled against physical theory, but conceived all things as an artistic whole. To Goethe, Science and Art were identical.

Sudhoff declares:

> Goethe possessed the gift of being able with eyes shut, to call up voluntarily into the dark visual field the picture of a flower or some variegated Gothic rose window; the figure thus produced would constantly change its form and color in kaleidoscopic manner from the center outwards, . . . he looked at colors from the subjective manifestation as a physiological phenomenon.

The great poet desired Nature to reveal her secrets of her own free will, that all her mysteries might be observed by the beholder's unaided senses. He was impatient with those who sought to trace all phenomena back to the ultimate forces concerned in their production and their maintenance. He preferred the open air under the bright sun, rather than slits and glasses in the dingy laboratory; and he was quite unaware that the problems of optics cannot be solved in the open air in the garden, with a single prism in one's hand.

In the possession of five healthy senses, he regarded himself as the center of all phenomena; and asserted, that what was discernible to the unassisted human eye was the real standard for everything. This was the reason why he found no pleasure in Astronomy (for which he needed a telescope), or in microscopic investigations. His deepest prejudice against Newton lay in the circumstance that Newton operated with a prism instead of making a sufficient instrument of his healthy eye.

The idea that white light could be composed of colored light seems to have been quite inconceivable to him. At the very beginning of the controversy he rails at the "disgusting 'Newtonian white' of the natural philosophers," an expression which seems to show that this was the assumption most annoying to him. Yet, Newton's assertion that white light is composed of all the colors of the spectrum was the first germ of that scientific view which was developed subsequently, namely, that white, which to the eye is the simplest and purest of all our sensations of color, is really compounded of materials less pure and complex. To Goethe such an hypothesis is unthinkable, absurd; while such an aspect aroused in him the passionate irritability with which he attacks his opponent, and it was also the cause of the overweening importance which he attached to these researches in comparison with his other achievements, as well as the cause of his inaccessibility to conviction or compromise. Newton's assumption that white light was composed of light of many colors seemed so absurd to Goethe, because he regarded the subject from an artistic standpoint which compelled him to seek all beauty in direct terms of sensory perception.

Johannes Müller, who revered Goethe beyond his power of expression, explained the difference between Goethe and himself with the statement, that, "The one possessed the poetic constructive power to the fullest extent, while the other directed his powers toward the examination of reality and of that which actually happens in Nature." As a commentary on this comparison, let me repeat what Goethe himself wrote in the history of his "Botanical Studies": "But as it is equally pernicious in science to keep exclusively to facts, or exclusively to abstract theories, I have deemed it my duty to write for serious men, the detailed history of my studies."

When we try to comprehend Goethe's theories, we find that he has no theory at all, and that he has no explanation of the phenomena which he observed. He starts with the proposition that all colors are darker than white, that they have something of shade in them. On the physical theory, white compounded of all colors must necessarily be brighter than any of the constituents. The direct mixture of dark and light, of black and white gives grey; the colors must, therefore, owe their existence to some form of cooperation of light and shade.

In a paper such as this, and at such a time, I cannot give in detail the many explanations necessary for you to have a complete idea of all the angles presented in Goethe's "Farbenlehre." Those who wish to obtain a more extensive review of the work may find entertaining accounts in Helmholtz's "Popular Lectures on Scientific Subjects," and in his "Physiologic Optics"; also, in Tyndall's "Popular Lectures," and in the "Life of Goethe," by Lewes. Suffice it, if we agree that the theoretical part of the "Theory of Color" is not natural philosophy at all, Goethe preferred to make a poetical show of it, rather than to search out the mysteries in detail with the instruments of precision accessible even in his day. The use of such machinery cannot be avoided. It is sad to contemplate the diverseness of Goethe's behavior. True poet that he was, was it not a strange dulling of his perception that he was not able to see the poetry and the romance connected with the dissolving of complex quantities into their ultimate principles, nor to conceive with all his endowed prescience that such investigation tended to the advance of human civilization? In his contribution to Science in other branches, his renown continues undiminished; but in this, to which he applied the same kind of intellectual exertion as he pursued in the former, it is lamentable that he should have failed, chiefly, because he did not utilize the methods necessary for the perfect comprehension of its principles.

It is difficult for us, in this later day in the history of Science, to understand how it ever was, that a question so closely connected with biological and physical subjects should have given rise to acrimonious controversy implicating the intellectual and moral judgments of the disputants, and how it could come about that one who occupied so lofty a position in the philosophical world could have been so perverse and vindictive, as was von Goethe in his estimate of the character of Sir Isaac Newton. In the region of Science, demonstration rather than opinion is paramount. Goethe, in preparing "Farbenlehre," used an amount of conscious labor beyond our comprehension. The observations and experiments there recorded astonish us by their variety and number. Tyndall declared, that Goethe was animated by the zeal of an apostle, who believed that a giant imposture was to be overthrown, and that he was the man to accomplish the holy work of destruction.

While Goethe regarded himself as the only person of his century who comprehended the theory of color, I could not find in his writings any references whatever to the epochal discoveries of Thomas Young, of England, who, eight years prior to the appearance of the "Farbenlehre," read before the Royal Society his immortal paper on the "Production of Color," the theorems of which to this day have not been refuted but were corroborated by Helmholtz, who, through the greatness of his own nature, sought to mitigate the absurdities of the pronouncements of his all-but-idolized fellow countryman, Johann Wolfgang von Goethe.

At this centenary of the death of the Poet and Philosopher, whose mind governed the thought of Europe for so many years, one hears it stated, amidst the adulation on every side, that he was also a man of Science; scant reference, however, is made to his contribution to the Theory of

Color. The futility of Goethe's theories, and the bitterness of the controversy, have doubtless led men to suppress the incident in the light of his accepted greatness in other fields of philosophy and art. And yet, is it not right that a statue should be studied in both the light and the shadows which fall upon it? In all that I have here given, I have had constantly before me a saying of the poet, "Es liebt die Welt das Strahlende zu schwärzen" ("The world loves to besmirch that which is brilliant"). Carlyle's "great, heroic, ancient man, the high bred, high cultivated Man of Letters," offers to medical men a problem in psychology, when one considers that subject as concerning the development and the action of the mind of an individual in his relations with his fellow men. I wish that I might have the power to conduct a just psychoanalysis of Goethe. In the controversy carried on around the "Farbenlehre," regardless of his inability to demonstrably refute the results of the experiments of others, one is struck by the arrogance of Goethe in demanding that the conclusions of his study should be accepted. And, again, one wonders why he would pour out on the heads of his opponents such epithets as those he uttered in his analysis of the personalities of Newton and his defenders. We must look to the history of the development of Goethe, to the native tendencies of his mind, exaggerated as these were by those acquired in his education.

On reading his autobiographical confessions, and in his delineation of the "two souls" in "Faust," one can discern that from his youth to the last of his days, Goethe manifested a singularly dual nature, a mixture of good (the Sublime), and inferior (the Natural). We can trace through the whole of his life the impulse to make "confessions," and he passed through periods of self-criticism. His disposition and inclination had always been introspective; and, even in boyhood, he was prone to consider and treat himself objectively, through such introspection he early was able to observe in himself this twofold spiritual existence. He was aware that he had been born with such a nature as to make it possible for him, while in action to also readily exercise his mind in deep reflection. Similarly, he also manifested a mixture of blindness together with the keenest perspicuity, which, although separable from each other, were capable of working out their various results side by side within himself. He tells that when he began his writings, he first wrote with a rush, unceasingly, on and on, not knowing what he had done until he saw it on paper, "a somnambulist, who is not conscious, as he writes, what flows from his pen; during which . . . a demon whispers to him where is to be found the weak side in men and things." He practiced the subtlest criticism, anatomizing men, others, as well as himself, allowing not the least embellishment of the results.

After taking his degree at the University, he felt the insufficiency of his own knowledge, and, at the same time, that of his examiners, and ever after until in advanced age, he manifested a singular youthfulness, which light-heartedness came to his aid in so many of his undertakings and prevented him from taking alarm at difficulties even in the face of those with which he had had no experience. He was encouraged by an extraordinary self-reliance through which he was confident that he was able to carry on whatever he undertook.

In this particular chapter of Goethe's life, one is struck by the note of his industry as an observer, for indeed, his eye and his interest were ever open and alert to the phenomena excited by the simple means which he employed, while in putting forward his Theory of Colors he offered it as the work of a "thinker in science, a manipulator of scientific ideas." But in our day of enforced demonstration of what we would advance as scientific fact, such "thinking" as that of Goethe depends upon the *a priori* ideas for verification, and cannot be regarded by us seriously; such a method, therefore, is a dangerous one. We may accordingly believe that in this field of scientific endeavor he was not a forward looking man nor yet even a "modern man" of his own times. On the contrary, he was rather one of those who belonged to the period of the Renaissance, for his thinking was speculative rather than expressive of the thoughts derived from investigation by the strict procedures of science, and, as already hinted he regarded all things always with reference to himself.

NOTE

What has been given here may be regarded as a compilation from the literature relating to a chapter in Goethe's life and works, taken without special acknowledgment, from numerous publications, chiefest among which are the following:

NEWTON. *Philosophical Trans.*, London, 1675; Lectiones Opticae, London, 1704.

GOETHE. Beiträge zur Optik, Weimar, 1791–1792. Zur Farbenlehre, in der J. G. Cotta'schen Buchhandlung. Tübingen, 1810.

Quarterly Review, London, 10; Art. vi, p. 427, 1813–1814.

KNIGHT'S Gallery of Portraits, London, 1835, 4: 56.

CARLYLE. Heroes, Hero Worship and the Heroic in History, Lecture v, The Hero as a Man of Letters, Tuesday, May 19, 1840.

EASTLAKE, C. L. Goethe's Theory of Colours, translated from the German with notes. London, 1840.

Edinburgh Review. 71: 99, Oct. 1840–Jan 1841.

HELMHOLTZ. Über Goethe's Naturwissenschaftliche Arbeiter. *Kieler Monatssch. f. Wissensch. u. Lit.*, p. 383, May 5, 1853

Handbuch der Physiologischen Optik. Ed. 3, Leipzig, 1911, Vol. 2.

Treatise on Physiological Optics, Translation of the 3rd German Ed. Edited by J. P. C. Southall, Optical Society of America, N. Y., 1924, Vol. 2, Sensation of Vision, p. 114.

LEWES, G. H. Life of Goethe. Ed 3, London, 1875.

GRIMM, HERMANN. Life and Times of Goethe. Trans. by Sarah Holland Adams, Boston, 1880.

TYNDALL. Goethe's Farbenlehre. *Fortnightly Rev.*, London, 27: n.s. No. 160, p. 471, April, 1880.

SUDHOFF, K. Garrison's Essays in the History of Medicine. Phila., 1926.

The ophthalmologist will find an interesting account both for and against Goethe's Theories, with a bibliography in Hirschberg's Geschichte des Augenheilkunde, Graefe-Saemisch Handbuch, Vol. 15, Pt. 1, pp. 18–25.

WILLARD PARKER

By JOHN RUHRÄH, M.D.

BALTIMORE, MD.

PART II*

6. Monday. Storm still raging, laying to, no sun. All sick. I am tired of tossing, my very flesh & bones are sore. My heart sick, the sea breaks over and around us in tremendous tumult. Poor Neptune is destined to command a turbulent element. The ocean I am certain I never should choose as my home but honest Jack mounts aloft as if at home, hangs among the ropes.
7. Tuesday. Storm rages, still, wind the same. *Laying to*, rocking and tossing, seas break over us. Our yawl has been stove in pieces, bulwarks broken, glass in the skylight carried away & we in the cabin ducked. Our poultry killed by wind & wave. Still sick, nausea, vomiting, no app., am as lank as a gray-hound. Toward evening of this day wind abates a little but sea worse than ever & danger of shipping & foundering.
8. Wednesday. More moderate; wind still ahead, sea heavy & often shipped. I am better of my sickness, some app., went on deck. A heavy sea came aboard & if by the order of Neptune he christened me thoroughly. Laying to—no sun, have not taken the sun since Saturday. We know not where we are but trust so far from land as to be safe, have drifted no doubt south. This evening Richard begins to feel himself. May tomorrow find us all better. Cheered by a fair wind and a sea that will allow us to set our sails and bear away for our port of destination. We have pleasant passengers, Good Captain & Mates & I trust that we shall live & enjoy ourselves. I have read the first volume of the "Outre Mer" this day, written by Prof. Longfellow of Brunswick. I am delighted with it. His stay at the Maison de Santé à Auteuil, the père la chaise. His visit among the vintagers on the Loire, his reference to a mother's affection is grand, good.
9. Thursday. Good morning, prospect of better times. Sun shines, wind & sea more calm, wind N.E. yet we all rejoice to see the glorious king of day once more. Rainbow in the west at ½ 8. Le coq. le compagnion du voyage treated us to the notes of his "Shrill clarion" and for the moment we were held spell bound in the idea of Land!! Land!! Ah, it is not so, the sweet delusion is gone! and old ocean we are still riding upon thy waters. Shall I ever love thee? I may, I do admire thee, whether in the display of thy boisterous power, thy foaming surface, thy dark caerulia aspect, studded with stars phosphorescents, which light up thy own dark bosom, but thine own awful grandeur forbids my *love*. The men are active, the prospect of fair weather inspires new life, sails are setting and we catch the breeze upon our "Larboard" born, & move on, on S.E.. Now 8

---

* Part I appeared in the May issue of the ANNALS OF MEDICAL HISTORY, p. 205.

days since we saw land. At 2 p.m. we saw at a distance a sail only the top of one mast only, and the sail top, 2 ft. square, it seemed as if a mountain of water was between us & could we but gain the summit we could look down upon it. What a glorious excitement the object produced, a fellow craft upon the "highway" of nations. Signal is hoisted & answered and soon we meet or to use the language of sea, we come alongside. The sight & feeling I cannot describe, all mount the deck, a thrusting gaze is passed between us as we roll up in speaking distance. Ship ahoy!! the masters cry out through their brazen horn. The name. Good ship Charlemagne, Brigg William Danish. Where bound? Havre? N. Y. *Longitude* asked for. Report us in N. Y. and all is gone. Each pursues his way, the evening is *delightful*, new moon visible, wind bad. Home, dear home, the earthly center of my affections. Doest thou think of him who is far away? Yes, the Husband & the Father lives in your thoughts. God preserve us. I now retire, hope for a quiet repose and a waking to a better day. I have just finished Longfellow's 2d vol. not as good as the first. His visit to Spn. to Rome good, he is a good writer but not up to Dewey. Village of Risica is very good. Sea sickness gone. Thank God for it.

10. Friday. This morn. the most pleasant since we left N.Y., the prospect of more auspicious gales inspiring us with new spirit. The sun was delightful & made the deck dry and pleasant. It became very squally, wind & rain; wind nearly in old point, East. Capt. discouraged, passage will be long and unpleasant. At evening more pleasant. The first of the day spent in lounging & talking, the latter in reading the Court & Generals of Napoleon. His character I do not much like, he was selfish and this was spurred on by an indomitable ambition. Joseph was the best of the family & had he remained at Naples with the two Sicilies he would have done well. In 1808 he was induced to go to Madrid and had the combined power of the Spaniards, the Portuguese & the English under Arthur Wellesley, now Wellington, and Napoleon clearly kept the Dictation of him. Lucien & Lewis had talents but Jerome was a fool. Napoleon was far from being justified in repudiating Josephine and marrying Maria Louisa, Princess of Austria. Louis married Hortense, the daughter of Josephine by her first marriage. Beauharnais, her son by the same marriage, was Eugene, Marchal Ney was one of his invincible Generals. Am now quite well. Oh, my dear home, I leave it with my Father in heaven. It is now *Mid'nuit*.

11. Saturday. The morn & fore part of the day very warm & pleasant, wind more south & we make a more easterly course. We have spent much of the time *basking* upon deck. The "Jack Tars" are all active in repairing parts of the rigging. The sea is quiet & our headway is slow.

12. Sunday. This voyage is a true type of life. Last evening I retired at ½ past 10. When I left the deck all was pleasant, breeze very light. All the canvas spread. Moon near the end of its first quarter. I spent some time in gazing at her. I thought on my dear home, as she seemed to be

looking down upon it. At about 2 this morning I was wakened by the cry & noise upon deck. A *tremendous squall* had come up and all hurry was made to take in sail. The cloud came up from the S.W. The "Spanker Sheet" was torn away, the flying Gib rent, the rain poured. The morning is rainy, sea very rough, the wind a gale from the N., the vessel *reeling* & pitching, all making a magnificent display of grandeur. The seas are constantly breaking over us, we are all *sad*, not sick. Oh, the Ennui of a sea voyage. The day I have spent in reading & thinking. The Bible, the Poetry of Grief, of woman and the life of Mary Queen of Scots, wretched, unfortunate woman; who that has any idea of happiness who can appreciate it from having actually enjoyed it, would ask to be *cursed* with a crown? During the first gale, we stove the *bulwarks* & the *cabin light*—in this last, the spanker, the gib and started the tackle of the Rudder, & lost 3 doz. of our live Poultry.

13. Monday. We have entered our thirteenth day & I long to make our destined port. Sea rough, wind fresh N. Sun seen. Therm. 55°. Saty it was 68°. Baromtr 30 rising.

14. Tuesday. Wind N. Sea high, cannot make much headway, vessel much motion. Can take the sun. The sameness of sea affords but little scope for the thoughts or imagination. We read, talk, play whist, eat, sleep. Today we assisted in overhauling the letter bags, some 5 or 6000 of them and destined to all parts in the south of Europe.

15. Wednesday. Since last night we have made but little headway from 1 to 3 knots an hour, wind very light & more from the west. The morning was very pleasant, all sails set & stay sails beside those on the masts. Horizon is beautiful this day, extensive, sea calm. We have now commenced our 15th day out; voyage will be long at best. The evening is now delightful, our sails are all spread to catch the western breeze & waft us to foreign lands. My home, my dear native land, my dear wife & little ones, my prayer to God is that I may return to you.

16. Thursday. This day has been a good one for us. The wind W. our course N. of E. from 5 to 8 knots per hour. All the fixed sails & 8 studding sails. The evening is delightful. We remained on deck till about 10. The moon in the Zenith, wind more fresh from the S.W., now go 8 knots or more. I feel now as if in time we should see France. When the weather is good this is pleasant, but we feel a great sameness of being. Friend St. John is getting quite over with his sea sickness, he is Gentlemanly and intelligent. We had in the evening a conversation upon *Geology*—Prof. Siliman & Dr. Bryant. *Geology*—2 theories, called formerly the Plutonian & Neptunian, now Hultonian & Wernerian. Both may be invoked, the former for earthquakes &c.—the latter for deposits. Center Liquid. 1. Stratum —Granite or primitive. We have none at the surface except where cropped out. We may have volcanoes in N.A., Siliman conjectured. Goodnight my dear home, I think of thee!

17. Friday. A change took place in the weather last ngt. took in the studding sails & the *Top Gallants* wind fresh from the N.W. at 8 a.m. We were going 10½

knots. Old Charlemagne ploughs her way through the waves as if she was acquainted with it. Grand. In afternoon the wind was strong, it split the studding sail and in the night, that is before 12 night, it carried away the fore top gallant sail, between 5 & 6 this afternoon we saw a brigg about three miles to the Leeward & standing southwest. We did not near her so as to speak. The thoughts that came over me on seeing her were somewhat sober. The idea of such a floating population upon the trackless ocean. We are all looking forward to the time when we may reach land once more.

18. Saturday. The wind strong from the N.W. Sea rough, high. We have been moving through the water the last 24 hours with very great velocity. We are encouraged but it is unpleasant. Cold, camp & much motion. I had much difficulty last night to retain myself in my berth the vessel listed so much. The weather continued very squally. I never knew it more so. Wind northwest, north & west.

19. Sunday. I have spent another of the days of the son of man upon the great deep. The day has been very unpleasant. Hardly possible to get upon the deck. Weather very, very squally, very strong N. & N.E. Sea in dreadful commotion, constantly breaking over us. We certainly cannot fail to be impressed with our entire dependence upon him who holds the elements at his command. We have been taciturn, sad & gloomy in the cabin. I have spent my time in reading & have been as happy as *possible*. I never was more conscious of my entire inability. God support us! Amidst the tossing of mighty waves & the howling of tempestuous winds. It is now our 19 day and the Captain has never experienced a more boisterous time. He says a man who has always been in the East India trade knows nothing of sea. We shall do well if we make port by the last of this month. I have been reading Gleig on the history of the Bible and am delighted with [it]. He meets the objections of the Geologists in a rational way and is not this Earth to be our future residence?

20. Monday. Last night more calm, wind East. This morning tacked ship and laid our course N.E. Weather still unsettled, not as squally as yesterday. We are now in Lat. 55° & Long. 35°. I shall rejoice if by the goodness of God we may be permitted to reach our port of destination. 20 days the mighty water has been our home. We have made so far a rough passage. I do not feel quite well at sea. Home, dear home, I think of thee far away, thou earthly center of all my affections! Heavenly Father all is committed to thy care! This day has been tolerably pleasant. Wind E. Been running since 2 p.m. on the Tack. S.E.

21. Tuesday. Wind E. not very strong, some squalls, running S. of E. from 5 to 6 knots. We are all in tolerable good health & spirits. This mng. saw a Bark, south west about 9 miles off standing on the opposite tack with us. She is probably bound East. We may speak her. The evening is very pleasant, the moon, the stars all appear in splendour but we have not had the opportunity to see the horizon free of clouds. I rejoice in

the goodness, the splendour of nature's works. In the midst of these I send a thought home. We are now in Lat. 55° & Long. 33°.

22. Wednesday. This day has been calm & pleasant. We have made but little headway during the day, this even. we made 6 or 7 knots. Wind south & Sth west & puts us on our way rejoicing. This forenoon I studied & wrote French. This afternoon read an hour or two after dinner, then at 5 mounted the deck, saw Sol for the first time drive his chariot into the ocean, the sight was magnificent. In the west were cumuli who by their reflection of the last rays of departing day heightened the grandeur of the scene. What a delightful ecstacy the whole view awakened. My home was in the west, my friends there too and that bright sun was theirs too, charming and delighting the thought. God preserve them. This evening we saw a *nautilus* called a Portuguese man of war. It has a small shell at the base which makes the Hull & it spreads a thin transparent membrane to the wind in consequence of which it sails beautifully over the waves—called P. man of war because found near the Portuguese Islands. We saw also a great many of singular animals resembling *Fungi,* had 4 long *appendiculae,* they swam by voluntarily opening & shutting the umbrella-like part, speckled in the mass & presented also a kind of star, very light red, long shreds were seen also. Saw hosts of small ones. What the name—Asteriae. *Animalculae*—seen by the microscope have been divided into many species. Book on this subject & the decomposition of different vegetables affords different species of these animalculae.

23. Thursday. We had a good run last night. Wind S.W. This mng. more east & we make too much northing. We can run in six points of the wind. Capt. has been down spirited today, thinks his voyage is to be very long, wind in the afternoon more fresh and seemed as if another blow was at hand but I hope we shall have no more of them. In the evening of this day I read Prucklau Muskau's letters with great pleasure. He described English manners and customs, a dinner party &c. at which he was—We Breakfast at nine—Dine at two—Supp. at seven. We live very well. Dinner 3 courses & desert.

24. Friday. This day I have been active in study, have felt well. Wind S.E. our course N.N.E. Lat. 49°. Long. 25°. This morning saw the Garrick and *signalized her*. She left N. Y. the same day with ourselves, with all her boasted greatness, she has not gained much of us. The day has been pleasant and we now calculate that a good wind will bring us to our port in 4 or 5 days. This day has completed our 23 day upon the water. I must have some letters written to send to America when we have the good fortune to reach the shore. And may I not expect to find some letters from my dear home? I long to hear from that earthly center of my affections.

25. Saturday. This day is tolerably pleasant, wind little more south & our course more east. This morning early a *ship* was seen a mile or two to the windward. Not known. Bound westward, wind very light. 4 or 5 knots an hour. During the evening it

became more east. Saw the Garrick again. She sails well with the wind but badly close hauled.

26. Sunday. We are spared to see another of the days of the son of man and it is more pleasant than either of the other three but cold. Our Latitude is above 50°. This morning at 8 the ship was put upon the *south-tack.* Wind S.E. more strong and we are standing about south, 2 points west. I have written some French today but find it dull. Have read some of Gleig and am pleased with him. *Dr. Peter Parker* now in Canton & who has been noticed in our papers as doing much for the eyes and in the way of operations, was from Framingham, Mass. and graduated at Yale 1831, ordinary scholar, but zealous as a divine & doctor, much good may he do. The *Chinese* go back with their history of the world about 35,000 years. This is from the writings of Dr. Morrison English & who was among them 30 years. The Chinese Empire contains 500,000,000 or more, more than half of the population of the whole Globe. The Bramins are very learned in their lore. Speaking of the Roman Empire it lived about 1500 years at the commencement of the Christian Era, it was at its height. Began to decline soon after, contain'd 6,000,000.

27. Monday. This day has been tolerably pleasant but rather cold. The wind still south east and our course against it. When shall we make port? I am tired of the sea.

28. Tuesday. Day rather cold, cloudy, wind as before, fresh. We are all fatigued yet we continue good natured. Oh, the trials of a head wind! We tack ship once in about 12 hrs., make about 2 points east on each tack. Some rain in mng. clear in the evening. Before 12 became cloudy, I spent my time in eating, reading, & studying French. I wish I could hear from my dear home, from my dear Caroline and the little gifts of affection. May our heavenly Father protect them and may yet again all rejoice in our meeting.

29. Wednesday. Four weeks this day since we left our American home. What new scenes have passed in review, the mighty ocean, its mighty wonders, the display of omnipotence!! This mng. for an hour or two wind changed into the N.E. but soon came back to its old point, S.E. We are now on the 8th tack, wind strong, sea rough, rainy. Lat. 48°, Long. unknown to the passengers. This mng. passed the Brigg *Verona* heading with ourselves. Did not speak her altho quite near. In conversing with Mr. St. John he informed me that a solution of the Bichloride of Mercury would remove the *indelible ink.*

30. Thursday. Wind S.E. as usual; strong, stormy, much motion of the ship and I *am sick.* Mth. dirty, bad taste, no app., an uneasy sensation at the epigastrium, head ache last 24 hrs., have taken very little into the stomach & that probably not digested well. It is certainly sad, we should have so much bad wind. This mng. saw & signalized the Geo. Washington from Liverpool for N.Y. She had a *fair wind.* She must have sailed on the 24. In afternoon saw Bark, did not speak her.

31. Friday. Brisk wind from the same quarter. S.E. rain over.

Sun out and pleasant, could we but have a good wind. I am somewhat better today, yet do not feel well nor shall I until I reach the land. We are now in *Lat.* 51°, Long. not known, have not been able to get the sun for two days. We see sails of some kind almost daily. We have spoke but one. This day at about 3 p.m. we begin upon the 31 day of our passage.

April 1. Saturday. This day somewhat more pleasant altho showers and fogg which in this part of the world indicates land. We have not been able to get our sun at noon these three days. Wind fresh, more sth. and giving us more of an Eastern course which is to our mind and we cannot fail to be thankful for that. I have hardly been on deck today, do not feel right, spit as if *pregnant.* Oh, sea sickness, art thou like that. At 8 p.m. wind got S.W. and we now are full of anticpn. & hope. We are as it were quickened into existence. I suffer from the cold, capillary circulation feeble, want exercise & a healthful app. Among the slender events of this day, we have to enumerate the slaughter of a pig & a pair of chickings. I have spent my time mostly in reading & thinking of my own *dear home,* am more happy than could be expected. What, but the love of knowledge, of usefulness ought to induce a man to leave behind so much that is very dear, to wander over oceans & in foreign lands.

2. Sunday. the 5th Sunday I have spent upon the great deep, its wonders how vast, yet as we become acquainted our wonder cools. Wind *good, very good,* & do we not rejoice? We made a good run *last night* & this day from 7 to 11 knots per hour. All our canvas studding sails and all is spred to catch the favorable breezes. Lat. 50°. L. 12°. We make an east by south course. *St. John* in conversation with him he informed me that an English naturalist had made out to be a secretion of the *Bee.* I think of home. Heavenly Father, preserve them who are so near & so dear to me. I hope I may soon hear from them. I must have a letter ready for America as soon as I may reach the shore.

3. Monday. We have this day been blessed with the sight of *land* once more who can conceive of the rapture of *this vision* but he who has been absent from Terra Firma some 30 or 40 days.

This morning we observed a change in the color of the water which bespoke our nearing the land—*soundings* had been made during the night. This day has been pleasant—wind fair. The last 24 hours we have made 250 miles. 20 min. before 4 p.m. Capt. discovered *Land!!* The *Scilly* Islands, in Long. 6¼, were seen directly ahead—a current sets N. & was carrying toward St. George's Channel. We made our heading sth. to enter the British Channel, sth of the Islands, there are many of them & many rocks, the Bishop & his Clerks, entered the channel about 6 p.m. Made St. Agnes. Lgt. house, revol. light. In night made Land's End, L. 5°45′. Lisard's Point, L. 5°11′.

4. Tuesday. This mng. rainy as is common here. Wd. N.E. against us—for we hoped to see Havre this day. This mng. we were boarded by an *English Pilot* an old man 70—when one of these men board or leave a ship it is the custom to give them

some 10 or 20 lbs. of Bread, meat, coffee, &c. &c. He brought with him 2 papers, London of the 11 & 23 of March. This was off Falmouth, England. We came very near running down a small sloop last night or about one this mng. At 10 this day a *gale* commenced nearly opposite Falmouth and continued all night. It was terrific & many poor fellows must have met a watery grave. Gales in this region are very dangerous. We are driving fast to sea. Sails &c have been carried away, the night is perilous.

5. Wednesday. Wind still blows very hard from the *East*. We have been laying to & floating to sea. We are now out of the channel. Last night was sleepless to most of us. But thanks to our great *preserver* that we yet live. These are the times when one becomes conscious of his *dependence* and pride of power vanishes into thin air. Sea very rough. Lost two sails in the gale, pig, sheep & much of our Poultry.

6. Thursday. this day cold, wind fresh. N.E. 4 N. are now making up the channel, no land seen, North of Guernsey we just now saw the *Salem* bound out from Havre, probably left yesterday.

7. Friday. This day we reached Havre, about 10 a.m., saw the city—the entre is beautiful. 2 light H. on the Left, the Telegraph. Ingouville the residences, Havre is singular in appearance. We had a narrow escape in passing the Casket Islands & Alderney Race—current strong. How strange one feels in a new land all jabbering about you & none who can sympathize with you, none whom you understand. Put up at the Hotel de N. York —Md. Morel, good—had my trunks overhauled at the custom house. Got my passport & for Paris. Havre has nothing about it interesting, abounds with Parots, Custom and Police officers, the Docks here made by Napoleon are very commodious and a stately work. Eat French dinner at 5 p.m.—had 8 or 10 courses.

8. Saturday. As I did not get ready to start for Paris today we have wandered over the city. Saw many of the Peasantry coming to market on the asses, mostly fine healthful women. Strange sight. One is amused at first at the sight of the *Sabots* and at their clattering noise—women, very many wore not bonnet but a clean cap. I visited *Notre Dame* and old Roman Cath. Church begun in 1575—200 ft. long 80 wide, Gothic style. Organ large & made in 1637. Statues of all the apostles and many Sts., Mary & the infant, the paintings ordinary, crucifixes at every part of the building. Have not seen a drunkard in France.

9. Sunday. This morning at 7 a.m. took the diligence for Paris—what a nouville carriage—wheels very wide—7 horses, 3 in the *thill—Phalanx* & 4 in the 2d. There are three Routes from Havre to *Rouen* which is the great place between Havre & Paris, the country between Havre & Rouen is *delightful—Champaign*. Road good—speed *rapid*—perhaps more so than in America. Many things I have been to wonder at & some to admire. No stones for fences—the only stone *flint*. Fences are rare—none on the road—none to divide ownerships, where they do exist, are made by the Hawthorn or some small bush trimmed down. Mounds in some

places make the fence. Wick Houses have no particular style. Roofs are either thatched or slated, the slate particularly in the village & city. Walls either wood-joice [joist] filled in with mud. When wood alone painted of various colors. Brick & flint stone. From Havre to Rouen there are three routes—the River, the Lower one along the Bank, the Upper which passes some distance to the north of the stream, our route was the lower. The Seine was in view most of the way. The banks are pleasant, nothing very striking. *Balbec* was the most pleasant place we saw where we breakfasted. We passed an immense ledge of *flint stone*—some places 100 ft. high—houses were dug out on the sth side. The inhabitants seemed devoted to their fete. At about three P.M. we came in sight of Rouen. It is an ancient city of 100 or 120,000 inhabts. Situated on side of the river & surrounded by high hills, its appearance as we enter it is most delightful, houses all covered with the best of slate. It seems to extend a great distance down the river. The old Cathedral shewed itself. It is a very spacious building, Gothic, its origin is traced back to the 3d Century, its alterations were various, in 1200 it was destroyed in the universal conflagration, it was rebuilt between this time & 1477. In its *Clocher* were 12 bells. In 1487 another tower was added called the Tour de beurre—terminated in the form of a crown. In this Cathedral was the 2d bell in Europe. 16 men required to ring it, destroyed in the revolution. Recast by Jean le Masson. On the Right of a splendid altar is seen the tomb of the Cardinals d'Amboise, Uncle & nephew. Cenotaph, their statues—on the Left is the cenotaph of Le Senechal, Louis de Brese. Tomb of Charles V, Roi de France—the heart of Richard, Coeur de Leon, King of England & Duke of Normandie, & that of Henry II his Brother. The windows are beautifully *painted* one in 1200, shewing the dress of that time, others in 1500. Art now lost. Many images in bas reliefs. Struck in 1822, Iron spire—440 feet high. Church of St. McClou (Maclou) & Sant. Ouen I saw. The latter is much admired for its architecture. The *Hotel de ville*, a fine building of modern style—Pillars Ionic—In this building. I went to visit the oldest manuscript in Europe. Saw where the maid of Orleans was burnt, the palace in which resided & was kept about 2 rods from where she was burnt, opposite was the chapel in which said her prayers. I regret very much I have not more time to spend in this city, the painted glass, the exterior aspect of the architecture—the vast amount of carving over the entrances is very striking. In Saint Ouen is a marble laver which reflects the interior of the church. The paintings we had not time to attend to in any of these.

10. Monday. This morn at 6 a.m. we reached the capital. Our journey from Rouen was in the ngt. We enter Paris by the gate. Here we saw many soldiers which the way one saw in every part of this country. We were taken to the custom house and baggage was examined—not so thorough as at Havre. After this we made our way to the Latin quarter of the city. Reached the Hotel de L'Odeon at 7 a.m. Is it possible—am I in the gay city of Paris—

known the world over for its gaiety, its debauchery, for its science. The city to which I have looked with to much longing in relation to my profession. Thanks be to God I am in the very same city. After making my toilette, I ventured out into the unknown city, surrounded by strangers & stranger tongues. I made for my banker, Wells & Co., wh. I found. Streets are narrow, buildings high & antique in aspect, few side walks. Pavements of a wedged shape stone. Breakfasted at 11, Fr. style. Dined at a Restaurant at 5 p.m. The weather is damp and very cold. This evening saw Drs. Shattuck & Clark.

11. Tuesday. This mng. much fatigued still but went to the Hospital de la Charité. One of the mighty concentrations of disease. I saw Bouillaud,[*] famous for his investigations of the heart; Fauquier, famous for diseases of the Kidneys. Saw Velpeau[†] in the ward & then cut out a breast. He is a man of great learning, not otherwise remarkable. Came home at 11, breakfasted. Engaged French instructor. At 2 p.m. visited the great occulist, Sichel, German, saw very many cases. Bot 200 of wood, for here it is sold by the pound.

12. Wednesday. This morning visited Hotel Dieu. What a mighty establishment! Accommodates 1500 Patients & full. Saw Chomel, who is perhaps the first man in Paris. Blondin also & Roux,[*] the latter I heard lecture & saw him operate for Hydrocile injection. Saw LeRoy d'Etiolles[†] operate for stone. Visited Sichel in the afternoon.

13. Thursday. Visited La Pitié, saw & heard Louis.

14. Friday. Hotel Dieu, saw 2 operations by Roux and in the afternoon saw Sichel's cases.

15. Saturday. This day I have busied myself at the La Pitié, coasting about the city, making observations & writing. These French are strange people, light, frivolous, gay, under the full influence of the Catholic Religion. Every 17 man is an officer in uniform. What an expence, such a standing army must incur.

16. Sunday. Another Sunday in this great city. Dr. Humphreys thought the French *desperately* wicked and any one with unbending orthodox notions, thinking no way but his own can be right, would inevitably fall into the same opinion. I did not rise this morning until 9. Breakfasted at 10—or took my bowl of Coffee. We then concluded we would go out into the city, attend church at *Notre Dame.* I must say that for attending church I can claim nothing in the discharge of duty. The Notre Dame is a hugh black old Gothic edifice. On an Island in the Seine, called Paris proper, the time of its origin doubtful. There was a temple here in the time of the Romans, vid. Galignani's work. It is said that upon this spot a church was raised & dedicated to *St. Stephen* in 1000 & so on we have accounts. We entered and within the walls were a few worshippers, some singing, some counting their beads. The clerical part of the inmates were busy bowing, reading, parading &c. &c. The interior of the building is beautifully gothic. 2 long rows of pillars reaching to the vault, windows painted, but not so beautiful as those of the Rouen Cathedral. The Painting & Statues, many splendid but in bad light, they are to be visited again. We left & passed into the Palais du Louvre. Where (strange for Sunday) we found an immense crowd and a regiment or two of the National guard undergoing *Review*—a part of the duty of Sunday. The city is full of *Saints, crucifixes, Madonnas,* but how little it would seem of the genuine spirituality of the Christian Religion, this day is truely a holly day, we sauntered through the Tuileries & then crossed the River to our dinner. On returning to our room we found a great crowd about the *Theater* where the evening is spent by most of those who are able.

---

[*] Jean Baptiste Bouillaud (1796–1881) of Angoulême, a great diagnostician and famed for his bloodletting. He pointed out the connection between aphasia and a lesion in the anterior lobes of the brain (*Arch. gén. de méd.*, 8: 25–45, 1825). He also called attention to the relation between heart disease and rheumatism (Nouvelles recherches sur le rheumatisme articulaire. Paris, 1836, and Traité clinique du rheumatisme articulaire, Paris, 1840).

[†] Alfred-Armand-Louis-Marie Velpeau (1795–1867), professor of clinical surgery at Paris and attached to the Hôpital St. Antoine, La Pitié and La Charité. He wrote a Treatise on Surgical Anatomy (1823), a three volume work on operative surgery with an atlas (1832), valuable for its historical data. It was edited in translation by Valentine Mott. His most important contribution was his Diseases of the Breast, 1854. He was a good practical man of whom O. W. Holmes said that "a good sound head over a pair of wooden shoes is a good deal better than a wooden head belonging to an owner who cases his feet in calf-skin."

[*] Philibert-Joseph Roux, 1780–1854, a pupil of Bichat. Succeeded Dupuytren as surgeon at the Hôtel Dieu. He was the first French teacher to give a systematic course of lectures. Famed for his plastic surgery.

[†] Leroy d'Etiolles was the first to introduce lithotrity in 1822. There was a violent controversy between him, Civiale (1824) and Heurteloup (1824) as to priority.

17. Monday. I have been engaged in medical matters today, visited the St. Louis, a large establishment dedicated by Louis 14 to diseases of the skin, called at Wells, found no letter, have one I hope tomorrow.

18. Tuesday. Visited Hotel Dieu this morning. Saw Blondin's Patients and also Roux, the former lectured and performed the operation of removing some Tumors from the scalp. Lectures quite well but in operation, treatment & Lecturing I think we Yankees can *beat.* Had a letter from my Dear wife who can conceive of the pleasure? No one but he who enjoys the endearing relations, kind Heaven has seen fit to bestow upon me. I rejoice, they were well. May kind Providence keep them thus. I hope they may soon hear from me.

19. Wednesday. This day at the Hotel Dieu. Saw Roux operate for fistula in Ano and the removal of the male breast in an encephaloid state.

20. Thursday. This morning visited the same Hospital, Heard Chomel, the best Lecturer in the city. This morning Dr. Hulme called. At 2 P.M. the funeral parade over the remains of a colonel of the H. Regiment of the R. Guard it was certainly a novel sight—

1. Music, *instruments muffled.*
2. Companies—arms inverted.
3. Priests, some afoot, some in carriages, Horses & carriages dressed in mourning. The Drivers in cocked hats, small cloths & boots high.

The Hearse was truly stately, very heavy, 2 large horses dressed in black with tall black ostrich feathers waving upon their heads, the carriage was black & heavy, the top open, covered & lined with black cloth. The corners of the Body were thickly set round with small tricolored flags. Upon the very top, as upon the top of our stage coach, was a large *Urn full* of black ostrich feathers, waving. Within was the Coffin & upon it his military apparel. The Procession was very long. What a foolish parade over a poor mass of dead matter? Our French Teacher makes us work every evening from 7 till 9.

21. Friday. This day I spent the morning at home writing letters. At 11 heard Magendie* lecture, saw his experiments upon a Dog, he lectures every Wednesday & Friday. Good, fat looking old fellow. This evening read French.

22. Saturday. This is full of rain. The weather, since we have been here, has been exceedingly cold, more so than in our own country. Carried letters to Wells & Co. for America. God speed them. Called upon Daniel Cutter, found him a pleasant little man. A part of the evening I have spent with Dr. Hulme. It is perfectly astounding to see how the women drudge.

23. Sunday. This Morn. rose at 6, dressed & walked through the Luxembourg to the Observatory. The walk is beautiful in prospect & the morn very delightful. Took a turn to the La Pitié, saw Louis,* followed him through his wards. At ½ past nine we returned to Lodgings, Breakfasted & then concluded to spend the day in *Père Lachaise*. At present the great Cemetary of Paris. It is just without the walls of the city & from 2 to three miles from my Lodgings. All Paris seemed to swarm, all out to enjoy the "beau temps." We made our way to the Seine, passed near the Bridge of Austerlitz, saw the Bridge of Louis Phillipe, passed by the place of the *Bastile*. This is where culprits are beheaded. Saw the colossal elephant of Napoleon, also the Monument, now building by Louis Phillipe. What strange people these French are, instead of regarding the Sabbeth, it is a most devoted Holly day. On our way we met with crowds of people in one place gathered around a *Legerdemain*, in another around music, in another a circus or an exhibition of buffoonery was getting up. Men & Women dressed in the most fantastic manner came out & addressed the multitude & many were induced to go in.

---

* Francois Magendie (1783–1855) of Bordeaux, was the founder of experimental pharmacology and a physiologist who believed in observations on living animals and laboratory experiment. He founded the first periodical devoted exclusively to physiology, *Journal de physiologie expérimentale* (Paris, 1821). He introduced many drugs such as bromine and iodine compounds, strychnine, morphine, emetine and others. He was the first to call attention to anaphylaxis by showing that repeated injections of egg white would kill rabbits sensitive to the first injection (1839).

* Pierre-Charles-Alexandre Louis (1787–1872) was one of the glories of French medicine. He did much to do away with theorizing and gave an impetus to the exact study of the manifestations of disease and pathological changes. He studied typhoid and gave it the name now used; noted the frequency of tubercles in the apex of the lung; followed Floyer's lead in the use of the watch in tuning the pulse and established medical statutes on a firm basis. Through his students he had a wide influence in the development of medicine, particularly in America where Holmes, Gerhard, the Jacksons, the Shattucks and others developed his methods.

These people will live for 5 sous a day that they may raise money for such exhibitions. I saw thousands of women washing in the Seine, strange sight, cold water & pounding for our clothes. Père Lachaise a spacious cemetery which every person who visits Paris ought to see. It is a splendid necropolis Contains now Acres & daily requiring extension. It is hedged in by a high wall and full of Trees cedars and . . . & cops. As we enter it from the city we ascend gently, the street or avenue has many workshops of marble & stone. The sides of the street & even within the enclosure are hosts of little establishments for making & selling Chapletes of the Life Eternal, yellow, black, white & mixed in with Box. We entered this splendid dwelling of the dead on the south side of a Broad Avenue, the whole seemed somewhat in 2 or 3 large terraces, this Broad Avenue at the distance of some rods divided into the right & left avenues. Near the center of this place is a chapel which has a grass plot before it & has the most extensive view of this great city that can be found in its vicinity. This place was consecrated in 1804, called Père Lachaise from the Jesuite who owned it in the time of Louis XIV. 50 F. buys an interment for 6 yrs. 125 per metre carre per perpetuelle. The monuments worthy of notice here.

24. Monday. This day have seen none of the Lions of the city, have attended at the Hospital la Pitié. Saw Sanson operate for cataract & Lisfranc[*] remove a uterus. Heard at the School of Medicine Magendie & Cruveilhier.[*]

25. Tuesday. Rose at six, dressed, read till ¼ after 6, visited La Pitié. Saw Louis. Saw Lisfranc cut off the right foot for scrofula at the Tarso-metatarsal articulation. He did it very well. Déjeuné ½ past 10 then visited the Louvre. What a splendid Gallery. The modern paintings, sculptures are now exhibiting. Specimens of Painting are 1865. I spent 2 hours but the crowd was too great to see, shall visit at another day. Saw our old friends Goyot & Collier. We came to the Chamber of Peers, could not enter. The assassin Meunier.

26. Wednesday. This morning rose early, visited La Pitié, the wards of Louis & Lisfranc, after my return & breakfast. I visited again the Louvre. I began by devoting little time to each painting but the work was too immense. There are many magnificent paintings, Dubois, I think surpasses all. His Adam & Eve in New York is the subject of great admiration. There is also a painting of Coedecs, representing the Young Lady in a state of Delirium in consequence of the

---

[*] Jacques Lisfranc, 1790–1847, was a surgeon of La Pitié and originated many surgical procedures or improved on older ones, for example his disarticulation of the shoulder joint and partial amputation of the foot at the tarsometatarsal articulation (Lisfranc's amputation), amputation of the cervix uteri, the excision of the rectum and lithotomy in women. His principal work was Nouvelle méthode opératoire (Paris, 1815).

[*] Jean Cruveilhier (1791–1873) of Limoge, a pupil of Dupuytren, was the first professor of pathology in Paris (1836). He was the first to describe multiple sclerosis (1835) and gave an early description of progressive muscular paralysis of the Aran-Duchenne type sometimes called Cruveilhier's paralysis. He published atlases of pathological anatomy with magnificent plates.

news of the death of her betrothed at the moment she expected him to marry her.

27. Thursday. Have spent some few hours at the Louvre. I wish my Dear Caroline & Kate could have been with me. About 2000 specimens of the Recents. Many of the Landscapes are good, many of the Marine scenes. 2 of ship wrecks where the crew was thrown upon the African Coast.

28. Friday. This day has been devoted to medical matters & I have seen nothing out worthy of notice. Prof. Stanley of Yale College called upon me. Gave some account of the disposition of the people to cheat. Mentioned that students were examined by Proxy and the Queens are married by Proxy. Saw 2 operations at Sichel's and two at La Pitié.

29. Saturday. This morning rose early & visited the Neckar. Saw Civiale,* he has a small special service. Some six or seven patients. He appears well, say 45, his establishment is a neat one and in very good order. Have written a letter to Wife and sent one also to Palmer. I hope I may hear from some of them quite soon.

(*To be Concluded*)

---

* Jean Civiale (1792–1867) was one of the first to use lithotrity.

AN INTRODUCTION TO THE HISTORY OF WOMEN IN MEDICINE

II. THE MEDICAL WOMEN OF THE MIDDLE AGES*

By KATE CAMPBELL HURD-MEAD, M.D.

HADDAM, CONN.

Imperial and Early Christian Times

THAT the female conscience and woman's naturally altruistic instincts for social service have always been strong and constantly active needs no more proof than the history of the women in medicine whom we have found in the ages before Christianity. Most of them were so selfeffacing that we scarcely know their names, yet so omnipresent that, whether as slaves or freedwomen or the highest royalty, the bright threads of their weaving run through the whole warp of the centuries. "The heart of mankind," says Garrison,[1] "has remained the same in spite of culture or the lack of it, in all ages and all nations."

We have seen that from the earliest times the priest and physician, the priestess and woman doctor were often synonymous. Their status depended upon their knowledge of magic which opposed the evil spirit of disease, or of religion which referred sickness to a higher power, or of medicines which, with or without faith, might cure any purely physical malady. One could wish that the Pharmakos had not been so generally associated with fatalities due to his poisons, and that the "wise woman" had been more often a medical scientist, but since primitive medicine consisted mainly in pummelings and sweatings and sacrifices to the gods, followed by bleedings and purgings as the alternatives or substitutes for journeys to holy shrines, and since the early surgery with flint knives and bone needles was faithfully followed by exactly the same operations with bronze or steel instruments, there could have been little incentive for new inventions, new and resourceful surgery, or the careful study of the action of drugs, for any vaunted remedy appealed to all uninquisitive minds. In fact, as we have seen, there are even today pagan tribes in remote lands perfectly satisfied with the methods and remedies used long ago in lands now civilized.

For a history of the pre-Christian centuries one might wish that some of the scribes had left us journalistic details of the daily life of the medical women of their times rather than inexact copies of old manuscripts of which they understood scarcely a word; and also that during the Middle Ages there had been less Byzantine freedom in editing manuscripts, but it is nevertheless evident that there was no time when skilled medical women were not more or less busy in caring for the sick, the insane, and those in labor.

We have seen that, as a rule, in no country except that of the Hebrews and during certain periods among the Greeks, did women hold medical positions much inferior to those of men, and that even among the Jews their inferiority was not particularly pronounced until near the time of Christ. But we shall find that during the Middle Ages the feeling of feminine inferiority was intensified by the fiats of the Fathers of the Church, and the education of women was more or less neglected in so far as it concerned theoretical, philosophical, mathematical and theological subjects, for women desired practical or scientific studies. It is therefore not surprising that men like Aristophanes, Cato, Martial and Juvenal made fun of all doctors, especially of men whom they called lazy, long-haired fops or impostors, who wore rings on their fingers and polished their nails with care, and practiced medicine merely for money. Nor is it surprising that women with their love for detail and their sense of pity for the sick and feeble should turn to the practical side of medicine, and not only study to prescribe intelligently for their patients but to nurse them with gentleness and skill.

---

[1] Garrison, F. H. Introduction to the History of Medicine, Phila., Saunders, 1921, p. 17.

* Part I appeared in the January, March and May issues of the ANNALS, n.s. 5: 1; 171; 281, 1933.

In investigating the work and industrial conditions of medical women down the ages it is, naturally, impossible to find any sharp line of demarcation between one century and the next. Especially is this true of the Romans just before and after the birth of Christ. In fact, during the first four hundred years of Christianity there was very little change in the manners and morals of men and women under Roman rule. Most of them continued to worship their multifarious gods and goddesses, to copy Greek art and literature, and to live as best they could. But neither the story of art and literature nor of wars nor of religious persecutions is the whole story of humanity, nor is the lack of biographies proof of the lack of important personages during any century. And so we may say that though the Christians failed to keep adequate records of their meek and unobtrusive medical women, we may safely assume that many of these women were as learned as the average medical man, and quite his equal in the art and science of medicine.

Fig. 31. A Renaissance Idea of St. Jerome in His Study. (From a Painting by Petrus Christus, Original in the Detroit Institute of Arts.) Other painters show different ideas, some of them depict him as a hermit in a desert with his lion; others place him in a great cave.

Since the transition from heathendom to Christianity was the work of centuries, and not merely due to the fiat of Honorius in the year 408 A.D., it is not surprising that the early Church of Rome adopted many of the old pagan rites from other religions. The chronology, astronomy, art, architecture and mathematics of the early Christian centuries came from the Greeks, Egyptians and Babylonians, at the same time that geography and a knowledge of the world was brought to Rome by the travelers and conquerors. With a widening of their horizon by war and conquest, however, came wealth to the few but discontent to many. What wonder that the converts to Christianity chafed under the old religious restraint with its hopelessness of anything better in the hereafter, and gladly took the new religion into their lives! In spite of fiendish persecution, therefore, they followed Christ's example and excelled their pagan forerunners in works of charity and love, healing the sick without asking for money in return, feeding the hungry, and visiting those in prison as Christ had taught his disciples.

In those early centuries after the fall of Corinth (146 B.C.) while the Roman empire was extending its boundaries all over the known world, not only did war destroy vast armies of Romans and their hirelings, but military colonies were being settled to guard the Roman possessions in far-off lands from Africa to northern Gaul, and from Persia to Spain and Great Britain. Women and children and the elderly men who were left at home had somehow to help pay the taxes for these conquests and get what pleasure they could out of life. Military roads, public baths, and royal palaces were built by the emperors to give work to the able-bodied men and women of the lower classes, but their home life was unhygienic and the morals of both rich and poor very lax. Julius Caesar had begged for money to be appropriated for draining the marshes in the Campagna, but the people preferred to keep their spare money for pleasure and for appeasing the wrath of the gods in time of sickness, since, they argued, if it were the will of the gods to send malaria, nothing could prevent it. Moreover, during the reigns of the good emperors, Hadrian, Antoninius Pius and Marcus Aurelius, there was not time to establish new methods of education, to hunt for the causes of epidemics, to prevent famine, and to stem the tide of immorality. Although Constantine declared religious freedom in 325 A.D., it was not until 408 A.D. that the pagan gods were finally banished, the old temples dismantled, and the Christian religion definitely established.

But if we think of these first centuries of the Christian era as wholly dark with wars, pestilences and immorality, we overlook the brighter side and miss the happiness of the little band of Christians in the midst of their persecutions. Gibbon surprises us when he says that the centuries between Nero and Diocletian were the happiest and quietest of the pre-Middle Ages. Perhaps he thought that because of their passive resistance the Christians were all happy, but from a woman's point of view the declining birth rate, the ever-increasing death rate, and the suffering and torments of the victims from Nero to Diocletian contributed so many horrors that the birth of the new religion is not associated in our minds with twilight sleep or anesthesia although the Christans seemed ready and willing to die, even in agony, for the sake of life and happiness in heaven. Therefore, as time went on and the Christians allowed men and women equal rights in the church, so this new freedom gave to the women an even more definite urge than ever before to study medicine, erect hospitals, and seek work out of doors and in the public eye.

We have seen, however, that from the year 146 B.C. educated Greek women were busy in medical work, and that they studied with men at medical schools in Rome or in the colonies, while the average uneducated woman was housed with her weaving and cooking and often treated as harshly as a slave, because, even if free-born, any wife might be divorced and set adrift for a mere whim of her pagan husband. However, since Latin was the universal language, the sometime traveler brought variety into their somber lives, and the quiet meetings of the Christians in the homes of the rich gave converts such joy as had never been theirs before, while to the ordinary citizens the public baths and games were a great diversion.

Historians have given us many glimpses of this home life of the Romans in the early centuries of Christianity. The marble palaces of the rich, even the ruins, are beautiful today. They were built around an open court in which there was a fountain or statuary and flowers; the walls were decorated with paintings, the furniture costly and comfortable. The costumes of the patricians were artistic and very elaborate, of silk or linen or fur, their togas were expensive, their sandals and jewelled caps of the finest materials, and they ate imported foods from gold or silver or glass dishes. The ruins of the great baths and theaters in Timgad, Carthage, Ostia, Rome and Pompeii show us how much money and artistic taste went into every detail of their daily life.

The homes of the poor, on the other hand, must have been not very different from the homes of the peasants in Greece and Portugal and the hill-towns of Italy in the nineteenth century. They usually were cheerless, built of native stone or clay or were mere huts with straw roofs, earthen floors, and a hole under the eaves for the escape of smoke. Their beds were mats or boughs laid on the floor. Their cooking in fair weather was done over charcoal, out-of-doors. There were no windows or chimneys. Their clothes were of the coarsest of home-spun wool, as dingy as those of the Bedouins today. They went bare-footed, and they ate black bread, goat's milk cheese, onions, wild honey, and fruits in season. If, in pagan times, they were slaves, each one had to be carefully taught how to do a special kind of work. Some of these slaves were so well educated as to save their owners all care and responsibility, for it was beneath the dignity of a rich non-Christian Roman patrician to do any kind of work except to hunt or entertain his friends. His wife, however, might do what she pleased provided she was not openly immoral and had several children. Criminal abortions were forbidden by law but not unusual, and, as we shall see further on, sexual immorality was generally condoned in men. Weddings and funerals and victories of any kind were celebrated with great display, and many writers have described the noblemen's feasts where all the costly wines, game and fish were eaten from beautiful dishes, while the feasters were entertained by dancing girls or acrobats or harpists.

It is interesting at the same time to remember that many of the Roman patricians in pagan times were exceedingly kind to their slaves, had physicians for them and hospitals, and sometimes freed them as a reward for their intelligence and faithfulness. Some of the rich men kept their own scribes and copyists who continually augmented their libraries. Pliny the Elder says that the encyclopaedias copied by the slaves were read aloud in the family by other slaves, and that such works as his on natural history were especially enjoyed. But these slaves also read aloud books on medicine, law and mathematics, Plutarch's biographies, the history of Herodotus, the geography and astronomy of Ptolemy to most attentive audiences whose memories had been trained to retain what was read to them. We can only wish that we knew what were the latest books by women doctors, and whether Aspasia and Cleopatra and Metrodora produced anything more popular than their very practical books on gynecology, textbooks which were hardly dilettanti subjects for use as fireside companions or in public places.

It has been said that the medical books copied during the first two or three centuries A.D., were mainly from the Greek or in Greek, but as the originals are lost we have no way of finding out how accurate the translations or copies were. We have seen that many of the great libraries in Rome were burnt at one time or other, and then the professional copyists all rushed to other libraries for work, for instance to Timgad, Carthage, Leptis Magna, or to Ephesus, where archeologists have identified great library buildings, so that if some books were perhaps never duplicated others were copied hastily with many errors. In the meantime, however, it may be taken for granted that in a medical environment created by men like Galen and women like Aspasia and her colleagues, the medical profession could not have been wholly bad, even at a time when social immorality was at its worst. We read that there was a "midwifery atmosphere" then in Rome and therefore whether with babies or abortions the "obstetrices id est medicae" were, of course, busy. We know, moreover, that Aspasia, Cleopatra and Metrodora were writing earnestly of the dangers of abortions and their prevention, while Juvenal was scoffing against the immoral midwives who constantly produced them.

Some of the midwives, called *sagae* (the *sages femmes* of the French), were actually magicians and abortionists. These sagae had many extraordinary remedies for amenorrhea, as well as love philters and aphrodisiacs, among which were the vaginal secretion of a pregnant mare, the roots of plants that looked like the sexual organs and other possible abortifacients, and though there was a heavy penalty for performing operations on a pregnant woman there was much money for the abortionist if all went as planned. Julia, the daughter of the emperor Titus, died from such an operation, but nevertheless many women "took the chance," and demanded an abortion if they found pregnancy inconvenient. Fathers gave away unwanted babies and had their sons castrated for mere whims. Pliny, Horace and Ovid tell astounding tales of the lack of chastity among the people of Rome at their time.

The woman doctor and trained midwife (the *obstetrix id est medica*), however, refused to be classed with the *sagae* or magicians against whom legislation was always active. Moschion, in the sixth century A.D., has given us his idea of a woman doctor or obstetrician literally quoted from Hippocrates, nearly a thousand years earlier. He says that she should be highly intelligent, very studious, physically strong, have self-control, be moral, quiet and prudent.[1] As he made no distinction between the woman doctor, the gynecologist and the obstetrix, so Martial and others considered them as one and the same, but they did distinguish them from nurses and the *sagae* who were less educated. The profession of medicine, however, was so well paid that in the course of time even uneducated people hung out a sign as doctors, and Martial (A.D. 40–102) said "*Quisque medicus sive masculus, sive femina*" could obtain a permit to practice. Oribasius, two hundred years later, felt that the conditions even in his time were so bad that all boys and girls in school should have six months' teaching in medicine so as to fit them somewhat for the care of the sick, or at least to be able to differentiate between impostors and educated physicians. Oribasius also advocated having the drugs in an apothecary's shop labelled so that every man could be his own doctor,[2] for the amount of hocus pocus during these centuries was dangerous beyond belief. Temple sleep had been revived, and besides this, priests and priestesses pretended to cure such a disease as tuberculosis with pine-cone powder in honey, and to draw out the sting of a viper by means of a stone taken from the grave of a young girl, and in many other ways to commercialize their religious office.

Rome, in fact, in the early years of Christianity could not be compared medically with Athens in the time of Hippocrates, and the surgery was much more carelessly done than in the time of Augustus. Osler, in his "Bibliotheca Prima," no. 31, tells us that Antyllus, 250 A.D., was the first modern surgeon to resect bones, repair fistulae, or enucleate cataracts, so that the two hundred different surgical instruments such as those found in the ruins of Pompeii and used in the first century must have lain more or less idle for two hundred years, or, what is more probable, they may have been used unskillfully by self-taught surgeons who made up in gold what they lacked in conscience. As for self-appointed teachers, Martial tells us that Symmachus, in a very obtrusive way, took his pupils with him to the bedside of his patients, sometimes a hundred pupils at once, and if the patient were not feverish before, he would have a fever after they had examined him with their cold fingers. Evidently Martial (A.D. 40–102) and Juvenal (A.D. 60–140), like Molière at a later age, could touch the sensitive spots not only of their contemporaries but of the men and women doctors of later ages. Juvenal says that whether a man were eye doctor or gladiator he went about his business in the same manner, and again, he asks: "How many patients did Themison kill in one year?" And he replies, "As many as there are infirmities in an old man." In another place he takes a fling against the abortionists:

> Poor women will bear children, and by stress
> Of circumstance feed them more or less,

---

[1] Von Siebold, p. 156, quotes Moschion in these words: "Quid est obstetrix?" and the answer is, "Every woman is an obstetrix who is learned in the diseases of women and is called upon to cure their diseases by the art of medicine." Von Siebold, E. C. J., History of Obstetrics. 1839.

[2] Albert, M. Les Médecins à Rome. 1894, Chap. x.

But you will never find expectant mothers
In gold-embroidered beds. The midwife smothers
The hope of life within them, that's her trade.

And of the astrologer he says:

That lady's path within whose hands you see
A well-worn manual of the stars, which she
Holds tight as others hold an amber ball
She has no need on prophet's help to call;
She gives to others aid.[1]

From Martial we pick the following:

A doctor once, Diaulos now
Prepares men for the grave.
A prudent man, he reaps the fruit
Of all the drugs he gave.[2]

And another:

He bathed and supped with me—how bright he seemed;
Next morn they found him dead. What fell disease
Slew him so suddenly? Alas he dreamed
That by him stood the quack, Harmocrates.[3]

Although Martial and Juvenal made fun of the quack doctors and impostors, the more attention was called to them the more their tribe increased. A generation after Juvenal came a famous man named Quintus Serenus Samonicus (put to death in 211 by Caracalla), who invented all sorts of magical words to be used with his medicines. The word *abracadabra*, for instance, was to be written in cone shape on parchment, leaving off one letter in each line and wearing it suspended from the neck for nine days. This was a cure for any disease. In other cases the patient was told to throw the parchment prescription into a running stream, or boil it with the medicine, in others the remedy was to be accompanied by a formula repeated fifty times. Sometimes the prescriptions were written in rhyme for easy memorizing, but whatever the trick Samonicus got rich by his system.

Besides Samonicus there was a certain Crinas of Marseilles, who cured throngs of patients by appealing to the stars for their benefit. It was said that he became so rich as to be able to pay for a war! These instances are cited merely to show what the well-educated medical women had to contend with in their honest efforts to give their patients every advantage of the best skill known to the best teachers, while at the same time Lucian, a contemporary of Galen who died A.D. 200, agrees with the other writers that many of the medical teachers were profane, impudent boasters, but on the other hand we have found a few who were like Galen, well trained and honorable. Certain "*obstetrices id est medicae*," says Lucian, were appointed officially to determine pregnancy in doubtful cases, or to determine the paternity of a foundling which had been thrown, un-named and unregistered, to the wild beasts or serpents because its father would not own it.

Such, then, were the conditions of medical life and practice in the time of Galen at the beginning of the third century after the birth of Christ. It is worth while to note that in none of his works that have come down to us does Galen mention the Christians or any other religious sect. He was a Stoic, and he belonged to no medical cult, neither Methodist, Empiricist nor Dogmatist, but he did believe in the humoral theory, in the teachings of Hippocrates, and in himself. He is said to have written nearly five hundred treatises, half of them on medical subjects, and of them all only eightythree have been saved. It may have been because Galen disliked surgery that he relegated it to an inferior position where it was left to women and barbers for more than a thousand years, but it was through him that the four humors became welded to the four vital spirits from the brain and heart and liver, and these theories controlled medical thought to the seventeenth century.

---

[1] Translated by Wm. C. Wright. Withington, E. T. Medical History from the Earliest Times. 1894.

[2] F. W. Nicolson, transl. Book I, XLVII.

[3] Book VI, LIII, transl. by Wright.

These first centuries of the Christian era were, as Gibbon says, but the calm before a storm. The government of the Roman Empire was becoming more and more unstable, for taxes were hard to collect, work in the cities was scarce, morality at the lowest point, and pestilences stalked unhindered by day and night. Galen himself fled from Rome during the plague, but he was hardly better off in the Campagna. Famine forced the common people to desperation while the rich were giving themselves up to debauchery of all kinds. As the Christians were increasing in numbers and strength the Emperors were more and more fearful of their thrones, hence persecutions of the adherents of the new religion were rapidly multiplied. It was no new thing to imprison and torture people for impiety to the old gods. Socrates had been forced to drink hemlock for this very reason. Akhnaton, of Egypt, had been unable to force his religion on an unwilling nation or to displace the priests of the old temples. It is small wonder, then, that the Christians of Rome and its colonies were hated by the priests whose living depended upon the credulity of the citizens. Moreover, as the hated Christians were trying to make life easier for one another and to cure diseases without asking for money, the pagan healers and impostors were ready to fight for their life against these men and women of the new sect. The more they were persecuted, however, the more the Christians increased in numbers. They opened schools and taught Greek and Hebrew as well as the usual subjects. The position of their women was quite as good as that of the men, for St. Paul had said that all should be "brethren," and as Phoebe, the deaconness, was his physician, "a succourer of many and of myself also," so others were practicing medicine and still other women preached, baptised converts, performed the duties of priests, and even voted for the bishops. As their converts were from many nations, so, even in the first century, St. Paul had advised those who could not talk different languages to keep silent in meeting. This must have been hard for the women, but nevertheless up to the time of Tertullian the Carthaginian (A.D. 150–230) women were by no means subdued either by the Fathers of the Church or by the enemies to their faith. St. Paul seems to have had two women relatives in Tarsus who were Christian doctors, St. Zenais and St. Philomela, the "lady with the lamp," and in a letter written by Anianus to St. Paul we again find mention of the obstetrix or woman doctor in this statement, "*Quoties de mulieris praegnatione dubitatur, quinque obstetrices, id est, medicae, ventrem jubentur inspicere.*"[1] And, speaking of correspondence, it seems that St. John shared the views of his friends that Christian women should do whatever men did, for he wrote "with the pen of an eagle" to "elect" women as to angels and churches.[2]

---

[1] Chauvin, J. Étude historique sur les professions accessibles aux femmes. 1892.

[2] Le Moyne, P. Gallerie of Heroick Women. 1652. Preface.

Although the early Christian women may have been happy from a psychological standpoint, their flesh must have suffered agonies in the dens of wild beasts while they were singing psalms to keep up their courage, but knowing the positive vehemence of Tertullian we are not surprised that he chose this moment for praising their faith while humiliating "his beloved sisters" still more. So he wrote that they must be even more humble and "make no parade of their humility to be seen of men," i.e. they must keep out of sight as much as possible. If a woman were a widow he would consent to her second marriage provided she would convert her new husband to Christianity, for, he adds, "It is because of what you, Eves, did for us as unsealers of the forbidden tree, that the Son of God had to die." It is not recorded what the "beloved sisters" answered, but their silence gave him boldness and he both scolded and admonished those who were medical women still further, for he had ideas on birth control and he knew that the population of Rome was steadily diminishing, that abortions were very common, and that certain low-class women made their living by causing miscarriages. Therefore he hurled invectives against the whole class of midwives and women doctors in such words as these, "If a child is extracted dead it verily was once alive. It is your tubes, your speculums, your dilators and hooks that are to blame for causing this destruction of the fruit of the womb." We may thank Tertullian for giving us this description of the instruments used by the obstetricians of his time while at the same time we wonder if the Roman or Carthaginian women had deformed pelves from rickets or beri-beri, or osteomalacia, or if their babies were sickly from lack of the proper vitamins in their food.

Evidently, not only art and literature but medical knowledge was slipping steadily backwards in this third century, and we may doubt that there was much actual health and happiness among the Romans or their Colonists. The soldiers in the far away provinces had set up governments of their own, had taken barbarian wives, and were ready to resist compulsion from Rome. Zenobia, in her oasis at Palmyra, dared defy the Roman legions for years, for "she knew all science, history, and military art," but she was finally conquered and taken to Rome in 273, to complete the triumph of Aurelian; her brilliant daughter became his queen and thus in the next generation Zenobia's granddaughter became Queen of all Persia. It was she who introduced Greek medicine into her adopted country, and protected the doctors and teachers in the new medical school founded at Edessa. Indirectly, therefore, we have Zenobia to thank for saving Greek medicine to the world, for the successor of this school at Edessa became the great school of the fifth century at Gondesapor, with its medical library, its famous teachers and its Arab writers.

But wars and plagues and persecutions took a tremendous toll in lives and property during the third and fourth centuries. When Diocletian ascended the throne, in 284, he evidently had no intention of becoming a benevolent monarch, for as he feared their cult he increased the persecution of the Christians at an almost unbelievable rate. Saints and martyrs by the score were killed by his orders. Many of them were medical men and women, Saint Theodosia and Saint

Nicerata, Saint Cosmas and Saint Damien of Asia Minor, Saint Thekla of Seleucia, and Saint Fides of Conques being among the number. After the death of these saints, however, such miracles of healing were performed at their shrines or by means of their bones, as they never did in the flesh. These medical martyrs had learned the art of healing from their mothers and "the Holy Ghost," but when we find that Saint Fides was only a little girl of twelve when she was martyred we can no longer doubt that faith, not science, brought about her cures. There is evidence, however, that Saint Theodosia, the ancestor of Saint Procopius[1] of Gaza (465–528), was a well-educated physician and that she did a great deal of good during her short life, for her fame as a doctor and surgeon long outlived her death.

We must not think that only Christian women were practicing medicine in those early years for we remember the splendid work of the Greco-Romans, Aspasia and Cleopatra, pagans both, and we know that the wife of Antoninus Pius, Faustina, had founded public hospitals as well as hospitals for her slaves and guests, and was greatly interested in the study of medicine, probably because she was a friend of Galen and his school; and Julia, the wife of Septimus Severus, was also active in promoting medical charity. It was for her that the life of Apollonius of Tyre was written. Lanciani tells us that even before the time of Fabiola, who is often quoted as the first woman to build or equip public hospitals, there were several such hospitals in Rome and throughout the Empire, hospitals for bakers, for pilgrims, for those afflicted with diseases of the eyes, for apothecaries, and others, built like palaces, their windows facing the sun, where women of the nobility themselves cared for the sick.

Moreover, while the persecutions were increasing many pious Christian women and men sailed for Egypt to lead a life of religious asceticism. At Oxyrhyncus, on the Nile, there was a community of 10,000 women, kind to one another but scourging their own bodies and fasting for conscience's sake. Humility was their main creed, and we may suspect that the humility which Tertullian had urged was one reason for their subjection in all the years to come. In 533 the Church Fathers at the Synod of Orleans declared that women were no longer to be ordained to the priesthood. But this is a peep into the future, for in the third and fourth centuries, as we have seen, learned women were still doing the best medical and religious work in the great cities of Italy and the Provinces. They had access to fine libraries, and to the medical books of Celsus, Galen, Soranus, Aretaeus, and to those of the famous women doctors who had not been long dead.

Among the most noted of these Christian patrician medical women was Fabiola, who died in 399. She had studied all the arts and sciences, for she was very rich and had a brilliant mind. At the age of twenty she was converted to Christianity, was married a second time, and became a widow again not long after. In order to expiate the crime of her second marriage and her early frivolity, she followed the teachings of Saint Jerome (331–420), her friend and correspondent, and devoted herself to a life of medical charity not only in Rome but in the Holy Land. She was a physician in every sense of the word and a nurse as well, for, as Hippocrates had taught, her hands were as useful as her brains, and massage, soothing applications, and gentle manipulations were often as necessary as medicines.

---

[1] Schacher, P. F., and Schmidius, J. H. De feminis ex arte medica claris. 1739, p. 49. See also Nicephorus, Book VII, Chap. XV.

Withington[1] says that Fabiola was somewhat of a surgeon,[2] and none of her contemporaries ever referred to her as one of the "parabolani" of any hospital, meaning thereby a nursing attendant under the authority of some physician or priest. Her life in Rome during the persecutions of her friends must have been harrowing in the extreme. Cardinal Wiseman, in 1854, after a long study of the life and times of the early Christians in Rome, wrote the story of her life and showed the steps by which rich women became the leaders in all medical work and went wherever they were most needed. Saint Jerome, writing to a friend about Fabiola's work and that of other Christian women, said: "The Gentiles themselves never took account of the sex of their women but of the degrees of their intelligence. . . . Volumes would be necessary to recount the lives and deeds of these women." As to his own contemporaries, Saint Jerome had only praise for those like Fabiola who were untiring in their devotion to the sick and needy, while, as he remarks, pagan women were being bathed in milk and served constantly by their slaves. He tells us that among the wealthy patricians on the Aventine Hill there were "three quiet Christians," Fabiola, Marcella and Paula, reading Homer in Greek, studying Hebrew, singing hymns and praying, and constantly visiting their patients. They had followed Helena, the mother of Constantine, to the Holy Land, where Helena had found the Cross in Jerusalem in 325. Marcella then became a hermit like Saint Anthony and Saint Jerome, Paula settled in Bethlehem, and Fabiola returned to Italy and opened hospitals in Ostia at the mouth of the Tiber, and in Rome.

Saint Jerome gives us the names of fifteen other women of his time who had studied medicine and were devoting themselves to the care of the sick, without fees, opening their marble palaces for this purpose, or if they were martyred, they left their homes to the Church.[1] Lanciani[2] tells us that the palace of Marcella, on the Aventine, was one of the largest, and its ruins were discovered by him in 1903, almost fifteen hundred years after its destruction under Alaric. He says also that Fabiola was converted by Marcella, and hers was the first hospital to be opened and "the best of its kind," "*Prima Fabiola nosoxomeion instituit in quo aegrotantes collegeret de plateis et consumpta languoribus atque inedia miserorum membra foverat.*" A later writer says of her, "Few physicians had so much moral or intellectual ability as she, so serious without pedantry, simple but not vulgar, quiet but deeply thoughtful." Saint Jerome said that the patients whom she gathered from the gutters were covered with sores, their eyes blinded, limbs mutilated, their whole being reeking with disgusting smells, and dying in agony. She herself died in 399, mourned by thousands.[1]

---

[1] *Op. cit.*, p. 120.

[2] Nutting, A., and Dock, L. L. History of Nursing. 1907, 1: 125–134.

[1] Gibbon, Decline and Fall of the Roman Empire. 1788, 4: 308.

[2] Lanciani, R. The Destruction of Ancient Rome. 1903, p. 58.

Paula, the friend and colleague of Fabiola, was born in 347, a "descendant of Agamemnon." She was so expert a scholar of Hebrew that on becoming a widow, she and her daughter settled in Bethlehem, where they founded a hospital and monastery for the Jews and served them untiringly. Lecky and Gibbon both tell us interesting facts about these women, and Jerome, writing to their pagan friends in Rome, asks how they can wear silks, and permit themselves to be carried about by eunuchs when Paula was wearing sackcloth, trimming lamps, bathing the sick, and giving medical treatments. When Paula died, 404, he said that those whom Paula had bathed in the blood of the Lamb needed no other baths.

Haeser[2] says that the efforts of Christianity were nowhere seen more clearly than in the uplifting of womanhood. Medical women of the third and fourth centuries were divided according to their studies into classes called *matriculae*, *parabolani*, and *diakoneien;* the latter were allowed to assist at baptisms of women and children. Virgins gave themselves voluntarily to the Church without taking vows, and Constantine (272–337) protected all mothers by legislation, for they were "*matris familiae majestas.*" It is interesting to note, however, that the Christian women had no sympathy with prostitutes or others of doubtful morals. It was to avoid temptation by women that St. Anthony fled to the desert at the end of the third century, and St. Simon Stylites a century later mounted his pillar in order to mortify his flesh.

Among the great hospitals of the fourth century Christians, we should mention that of Saint Basil of Cappadocia (born 329) and his sister Macrina, in Cesarea. They had studied premedical subjects with their grandmother, but medicine in Athens, where they learned all Hippocratic lore. Their hospital, built in 370, was so large that it was "like a walled city or the pyramids in size." There were separate pavilions for different kinds of diseases, and also houses for physicians and nurses. In this and two other hospitals erected by St. Basil and his sister, there were medical schools where bedside instruction was given the students with notebooks in their hands. It is a pity that the notebooks are all lost, but, as Charles W. Eliot said of such teachers, "We can not but believe that it was just for countless quiet, simple lives like this that God made and upholds the earth . . . their reward was the feeling that they had helped to right a wrong, to soothe a pain, and to overcome an evil." The story of these hospitals, as told in the pages of Nutting and Dock,[1] reads like the description of our modern nursing hospitals with their discipline, the pleasant relations between their doctors and nurses, the white garments, dainty food, clean patients, airy rooms, sanitary conveniences, and the universal oversight of every detail by Macrina, of whom St. Chrysostom wrote, "Macrina was a great organizer, independent thinker, and as well educated as Basil himself." "She was next to the Virgin Mary in sanctity," a later writer adds.

---

[1] Cardinal Wiseman's book, "Fabiola or the Church of the Catacombs" (1854) has been translated into nearly every language. It was a tremendous success, for it gives the student an archeologist's point of view of the early Christians.

[2] Haeser, H. Grundriss der Geschichte der Medicin. 1884, p. 442.

[1] 1: 123–126.

Saint Chrysostom of Antioch, bishop of Constantinople, 398–407, mentions the names of many "manly women" who were doing medical work during his lifetime. Among them was Olympia, of whom he says admiringly, "she was a good organizer, a widow and a deaconess at the age of twenty, and head of a community of women who were all healing the sick and living the life of charity." We gather that it was she who had cured him of stomach trouble. Olympia had such great wealth that the Emperor Theodosius wished to marry her, but she refused his suit and devoted her life to her work. She had forty women under her, but they were very ascetic, thought it holy to go unwashed, to wear ragged clothes, and to go about hungry and sick. Olympia seems to have been older than Macrina, but fully as learned and able. Like St. Basil's grandmother, St. Chrysostom's mother, Arethusa, was also a very "manly" women of Antioch and Alexandria and very learned. Chrysostom and Arethusa together had oversight of three hundred and forty-seven xenodochia or nosoxomia or hospitals connected with the churches in Constantinople. They also had charge of almost inaccessible monasteries on the crags of Greece and Palestine.

It is interesting to find that the writers of the fourth century were so appreciative of the work of their contemporaries among the medical women.[1] We have seen how Saint Jerome valued the work of Fabiola, proclaiming, "If I had a hundred tongues and a clarion voice I could not enumerate the number of patients for whom she provided solace and care," and how Saint Chrysostom praised Macrina and Olympia and the other women of his period. Theodorus Priscianus, sometimes called Octavius Horatius, having cited famous medical women of earlier centuries, also praised the women doctors of the fourth century, women whom he knew and to whom he cared to dedicate his own book, and whose remedies he was glad to use for his own patients.

These women were named Leoparda, Salvina, and Victoria. Part III of his book is dedicated to this Salvina "because of her wisdom."[1] Probably they were all practicing medicine at the court of Gratian (359–383), for he was Gratian's body physician. Priscian's book, being written for women doctors, contained many quotations from Soranus and Cleopatra and Aspasia. He wrote parts of it in rhyme, to be the more easily memorized. His friends, Philumenos and Vindicianus, were also copying these same books. In addressing Victoria, Priscian urges her not to give up the practice of medicine on any account, but to study the causes of sterility and write her case records, a very good bit of advice. He called Salvina "his very gentle colleague," and he carefully described for her all the more important details of the practice of gynecology. He tells his readers that Leoparda was a noted gynecologist, but we find that her remedies, like those of all the practitioners of her time, were not more scientific than those of Dioscorides. Neuburger,[2] however, says that Lactantius, another teacher of this century, was still quoting the anatomy and physiology of a far earlier period, stating, for example, that the uterus is bifid, and that male children come from the right side, females from the left, and that semen is manufactured in the head. Lactantius, according to Sarton,[1] was a Christian apologist called the Christian Cicero, but evidently he preferred theory to investigation, and he cared nothing for the teachings of Hippocrates or even of Galen. We have seen that a Persian manuscript of a much earlier date described the uterus as having seven chambers, in each of which there might be a baby, and this belief was still prevalent in some places, as is seen from the story of Sydrac and Boctus[2] which continued to be popular for centuries.

---

[1] See Cambridge Mediaeval History, Vol. I, Chap. xx, Thoughts and Ideas of the Period (fourth century), p. 596, art. by Rev. H. F. Stewart.

[1] Theodori Prisciani Archiatri, Ad Salvinam Praefatio, in librum tertium, qui inscribitur Gynaecia. Spach, 1597, p. 28.

[2] Neuburger, M. *Op. cit.*, 1:300.

Gratian's court was made up of Christians. He had not only abolished the Vestal Virgins and expelled the worshippers of the old gods, but also the quacks and impostors who offered relics of the saints as cures for disease. But nevertheless the faith of the Christians was fixed upon such relics, and they were glad to buy any sort of bone or bit of hair that was labelled with the name of a saint. Both Gratian and his forerunner, Constantine, who ruled 306–337, were protectors of all the really capable physicians; they proclaimed them and the clergy taxfree, and gave them liberty to teach what and where they chose. But because Constantine found many of his subjects in Rome quite unwilling to take up certain of his new-fangled notions, unready for his progressive scientific and Christian ideas, in disgust he moved his court far away from Rome to the edge of the Sea of Marmora where he founded the city of Constantinople and built a church to the goddess of all wisdom and called it Saint Sophia. He invited scholars from all over the world to make his city their home, and promised them freedom from all disturbance. This move, as we know, resulted in separating the Eastern church from the Western, and was the immediate cause of stirring up all sorts of fanaticism, rivalry, and hatred among the Christians in Rome as well as in Constantinople. Somewhat later a Roman mob under Bishop Theophilus burned the great library in Alexandria, in 390–391, because it was mainly a Greek library, just as one had been burned under Julius Caesar and another was to be burned under the Mahommedans in 640. But nevertheless at this same time, the end of the fourth century, the Christians of Alexandria, both Greeks and Romans, were devotedly caring for one another during the plague and not asking whether patients were Jews or Gentiles, while the pagans thrust their sick into the streets to die. But the rivalry between the Greeks and Romans in religious and scholastic affairs resulted in banishing the Latin works of Galen, for example, to the monastic cells in the hills around Rome or in far away Persia. Evidently it also accounts for the loss of many books written by Galen's followers.

With all their new learning and piety, however, magic and superstition throve among the Christians as never before, and although, as Thorndike says, there must have been as efficient men and women physicians as in earlier days, the stories of the magicians have apparently survived while the more commonplace stories have been lost. Among the magicians of the fourth century there was at least one woman, and she was another Cleopatra.[1] She pretended to make gold by drawing concentric circles around a golden nucleus, a serpent, and an eight-rayed star. Her followers are not yet all dead, and in the Middle Ages they drew many adherents to their schemes, for they did succeed in making gold for themselves by their methods.

---

[1] 1: 608.

[2] See Part I, Persian medicine before Christ, in the January installment, p. 9.

It was during this fourth century, however, that Saint Augustine (354–430) and his mother, Saint Monica,[2] were studying medicine together at their home at Tagaste on the coast of northern Africa, the son evolving doctrinal theology while the mother went about among the poor and sick and those infested with vermin, using her medicines where they were needed, caring for women in labor, and giving comfort to the dying. Between times they carried on long arguments as to the viability of a fetus and the location of its soul, finally deciding that a child was viable from the second month of intra-uterine life, and that it was a legal being from the fourth month when its sex was differentiated. This theory settled the controversy for the Fathers for centuries.

Not only was this century a time of struggle for doctors and Christians but it was also a time of wars and pestilences as well as a century of changing populations. It brought about a decided mixture of races and in many cases an antipathy to new customs and ideas. At the time of Galen's birth, Rome is said to have had nearly a million inhabitants. At the end of Diocletian's reign, in 305, it had scarcely 500,000, and these were reduced to a paltry 15,000 after Totila's conquest in the sixth century.[1] It was in 303 that Diocletian and his colleagues ordered a general persecution of all Christians, after which he retired with satisfaction to his new palace and flower-gardens in Dalmatia where he died in his bed almost under the shadow of the temple of Esculapius.

Under Constantine, Julian the Apostate, and Theodosius, in fact to the end of the century, there was comparative peace throughout the Empire. Oribasius was then sent all over the world to collect books for new libraries and especially to find copies of Galen and other medical writers. This compilation, if finished, would have been enormous, but only three-quarters of his work was completed, and all but a fraction has been lost. Oribasius left nothing untouched,[2] including such topics as the Delphic oracle, the uselessness of surgery for cancer of the breast, but advocating a diet of figs and fig poultices instead of removal of the diseased organ. He advised watchful waiting as a cure for stone in the bladder. It is evident that Oribasius disliked surgery as did Galen. His book on women's diseases, cosmetics, and obstetrics was written "for the women doctors."[1] As for remedies advocated by Oribasius we find once more the disgusting preparations of the sexual organs of animals, saliva, skin, hair, nails, bones, urine, the feces of hedgehogs and dragons, along with clams, sponges, ambergris from the bile of a whale, the blood of a fledgling swallow for cough, pearls dissolved in vinegar and sea water for skin diseases of the rich, sulphur mixed with human saliva for impetigo, theriac for elephantiasis, and mercury mixed with clam juice for gonorrhea.[2]

---

[1] Lynn Thorndike, From Magic to Experimental Science, Vol. 1, Chap. v, p. 197, tells us about this Cleopatra. Sarton mentions her and a Maria, but is doubtful whether they lived in the first or fourth centuries.

[2] It is interesting to visualize Saint Monica, for her activities were much more practical than those of her hesitating and changeable son. She had been a Christian from girlhood, trained to works of charity and mercy, always worried because of the vagaries of Augustine, and always trying to convert him and control his life. The country where they lived on the coast of North Africa has the climate and flora of Algiers, where, in the late winter, the ground is carpeted with such little blossoms as the iris, oxalis, primroses, ranunculus and anemones, shaded by feathery locusts and tall cypresses and almonds and mimosa, February's blooms and harbingers of Spring.

[1] See Baedeker's "Central Italy," Introduction. Also Lanciani, op. cit., p. 156.

[2] Gurlt, E. Geschichte der Chirurgie. 1898, 1: 527, 532, 426.

The end of this century was, therefore, a time of depression and misery if not of the spectacular horrors of its beginning. Ammianus Marcellinus (330–395) wrote that the people were all under the reign of the devil, and that many an Anti-Christ was abroad under the guise of queer beasts and birds. The incredible stories of Apollonius of Tyanna, written for Julia, the wife of Septimius Severus, were fervently believed by multitudes. And yet not all of the people were gullible, for we find the poet Ausonius (310–394), a Gallo-Roman, who became tutor to Gratian, writing idyllic poems and essays, describing the scenes of his childhood, and recording the work of his aunt Aemilia, a woman doctor living near the Moselle, who had helped him get an education.[3] He says that she was a very skilful and honest woman doctor, and that she had studied medicine in order to assist her brother who was also a doctor. He also notes that she wrote books on gynecology and obstetrics and was much beloved by her patients. Ausonius was a friend of Saint Augustine, who was living at Milan and Rome while Ausonius was at the court, but although the two men were very different psychologically they both evidently admired intellectual women. Ausonius was as proud of his aunt Aemilia as Saint Augustine of his mother, and while the latter was composing his famous "City of God," the former was jotting down the homely memories of his childhood in words like the following: "My aunt, Aemilia Hilaria Matertera was a *virgo devota*, and though in kinship's degree an aunt she was to me a mother, bright and happy like a boy, and busied in the art of healing like a man."

Aemilia Hilaria Matertera Virgo Devota,
Tuque gradu generis matertera, sed vice matris
Adfectu nati commemoranda pio,
Aemilia, in cunis Hilari cognomen adepta,
Quod laeta et pueri comis ad effigiem,
Reddebas verum non dissimulanter ephebum,
More virum medicis artibus experiens,
Foeminei sexus odium tibi semper et inde
Crevit devotae virginitatis amor.
Quae tibi septenos novies est culta per annos
Quique aevi finis, ipse pudicitiae,
Haec, quia uti mater monitis et amore fovebas
Supremis reddo filius exequiis.

It is interesting to read of the daily life of the family and their Gallo-Roman friends, their food, their wedding festivities, and their funerals. "Aunt Aemilia" died at the age of sixty-three years.

(*To Be Continued*)

---

[1] Cambridge Mediaeval History, Vol. I.

[2] In the museums in Dalmatia today are found many faience jars belonging to old apothecary's shops labelled with the names of these substances.

[3] Decimus Magnus Ausonius. Opuscula, Part III, Domestica, p. 33, Ed. Rudolfus Peiper, Leipzig, 1886, Transl. by H. A. Evelyn White, London, 1919.

(From Trattato di Christoforo Acosta Africano, Venetia, 1585.)

EDITORIAL

NINTH ANNUAL MEETING OF THE AMERICAN ASSOCIATION OF THE HISTORY OF MEDICINE

THE ninth annual meeting of the American Association of the History of Medicine was held at the Willard Hotel, Willard Room, Washington, D. C. May 8, 1933. The President, Dr. Gerald Webb, presided. There were about sixty present. The meeting was called to order at 3 P.M. and the following papers were read:

Capt. Charles St. John Butler, U.S.N.: The Doctor as a Diplomat.
Dr. Leopold Vaccaro, Philadelphia, Pa.: Galileo Galilei, Physician-Astronomer.
Dr. Truman G. Schnabel, Philadelphia, Pa.: Dr. Osler and the Philadelphia Hospital.
Dr. Logan Clendening, Kansas City, Mo.: "The dear little Boy" (Edward Wortley Montagu, Jr.)
Dr. Robert J. Hunter, Philadelphia, Pa.: J. Cummings, Steward, and the Patients under his Care in the Revolutionary Days: From the History of the Philadelphia Hospital.
Dr. William G. Leaman, Philadelphia, Pa.: Tobias Smollett, M.D., Physician and Novelist.
Read by title:
Dr. Louis F. Bishop, New York City: The Evolution of Practical Medicine in New York City During the Nineteenth Century.

At the Annual Business Meeting the following officers were elected.

Dr. James B. Herrick, President
Dr. C. N. B. Camac, Vice President
Dr. William D. Middleton, Vice President
Dr. E. J. G. Beardsley, Secy.-Treasurer.

The evening (dinner) session was held at 7 P.M. in the Willard Room, Willard Hotel. Dr. Webb read letters of greeting from Dr. William H. Welch, Dr. Lewis S. Pilcher and Francis R. Packard, M.D., and the following papers were presented:

Dr. Maude E. Abbott, Montreal: The Evolution of Medical Journalism in Canada (1826 to date).
Dr. Archibald Malloch, New York City: James de Berty Trudeau, Artist, Soldier, Physician.
Dr. William Snow Miller, Madison, Wis.: The La Crosse Medical College, A Unique Institution.
Dr. Henry E. Sigerist, Baltimore, Md.: The Medical Literature of the Early Middle Ages.

BOOK REVIEWS

Medicine in Canada. Clio Medica. By William Boyman Howell, M.D. N. Y., Paul B. Hoeber, Inc., 1933.

The author of this useful as well as delightful addition to Clio Medica in his Preface disclaims any intention to write a systematic history of medicine in Canada, because the field has already been so thoroughly covered by Heagerty, and for the Province of Quebec by Drs. H. S. Birkett and Maude E. Abbott. What he has done is to give us an aperçu or birdseye view of some of the most interesting persons and events connected with the development of scientific medicine in Canada in such a way as to stimulate our interest for more. The names of two of the pioneer physicians of Canada, Michel Sarrazin, who came over in 1685, and Jean François Gaulthier, who arrived in 1742, are embalmed in botanical nomenclature, *Sarracenia purpurea* and *Gaultheria procumbens* (wintergreen) having been named respectively for them. Both Sarrazin and Gaulthier were not only well-trained physicians but learned naturalists, contributing much to the knowledge of the flora and fauna of the new colony.

The Hôtel Dieu of Quebec, founded in 1639, and the Hôtel Dieu of Montreal, founded in 1644, antedate by more than a century the Pennsylvania Hospital of Philadelphia, which was chartered in 1751. After the English took Canada from the French a great many English and Scotch physicians and surgeons settled in various parts of the land including Nova Scotia and New Brunswick. Many of these men were graduates of the University of Edinburgh and the influence of that school had a predominating effect in the development of medical education throughout Canada.

Dr. Howell gives a good account of the origin and growth of the Canadian medical schools and of the many interesting personalities who founded or conducted them. He also pays adequate attention to the various epidemics, such as typhus fever and cholera and that curious epidemic of syphilis known as Malbaie disease, by which the country was ravaged on various occasions. Dr. Howell has covered a large subject with an admirable conciseness which shows much judgment on his part.

The Memoirs of Sir Robert Sibbald (1641–1722). Ed. with an Introduction and a Refutation of the Charge against Sir Robert Sibbald of Forging Ben Jonson's Conversations. By Francis Paget Hett. London, Oxford Univ. Press, Humphrey Milford, 1932.

We owe the republication of this interesting little autobiography of an illustrious physician to the desire of its editor to refute a charge, made he thinks without foundation, against its author. All students of English literature are familiar with the famous conversations between Ben Jonson and the Scotch poet William Drummond of Hawthornden which were first published in 1711. Their authenticity was never questioned until 1925 when Mr. C. L. Stainer published a book in which he claimed that they were forgeries by Sir Robert Sibbald, basing his suggestion largely on the fact that the only manuscript known of the "Conversations" is one written by Sir Robert, which is along with a number of his other writings in the National Library at Edinburgh. This has heretofore been regarded merely as a copy, with no pretence at being the original record, and we think that Mr. Stainer's charge is completely overthrown by Mr. Hett in his "Refutation," and when one has read the "Memoirs" of Sir Robert he will feel rejoiced that that worthy man's reputation has been so ably vindicated.

Space does not permit more detailed consideration of this topic as we desire to direct the attention of our readers to Sir Robert's "Memoirs," the republication of which should arouse interest in one of the most eminent medical men of his time. The manuscript of these "Memoirs" has also a curious history. In Boswell's "Life of Dr. Johnson" he recounts a conversation in which he told Dr. Johnson that he had in his possession the original manuscript of Sir Robert Sibbald's Memoirs, which he had purchased from his uncle Dr. John Boswell, and that he was considering their publication. Boswell never did anything further in this connection. Mr. Bernard Quartich brought the manuscript from Boswell's greatgranddaughter at a sale at Sotheby's in 1893, and later sold it, but to whom is not known. Since then all trace of the original manuscript has been lost. The present publication is made from a certified copy made for the Advocates' Library (now the National Library of Scotland) in 1805.

The Memoirs deal with the chief events in his life until the year 1692. In 1660 he went to Holland, where he studied medicine at Leyden for eighteen months, chiefly under van Horne, Francis de le Boe, more generally known as Sylvius, and Vorstius. One of his fellow students was Nicolaus Steno, and Sibbald says, "He dissected in my chamber sometymes, and showed me there the ductus salvalis superior, he had discovered." Sibbald then passed nine months in Paris, "where I was well acquainted with the famous Guido Patin," who lent him books and the manuscripts of some of his writings. After some touring in France Sibbald went to London where he stayed for some time. He settled in practice in Edinburgh and was very successful. Sibbald was deeply interested in the natural history, geography and antiquities of his native land. Charles II appointed him his "geographer for the kingdome of Scotland," and he wrote much of great value. He was the chief factor in founding the Royal College of Physicians of Edinburgh in 1681, and in 1684 was its president, and in 1685 was appointed the first professor of medicine in the University of Edinburgh. In the same year he was obliged to leave Edinburgh. He had suddenly announced his conversion to Catholicism and, thereby, incurred the bitter enmity of many of his townsmen. His house was attacked and his life threatened. Sibbald went to London, where he was elected a Fellow of the Royal College of London and was treated with great kindness by Sir Charles Scarborough, Dr. Walter Charleton and the Honorable Robert Boyle. Sometime afterwards he returned to Protestantism and went back to Edinburgh, where he seems to have lived happily until his death in 1722. The only regret we have is that he did not continue his "Memoirs" to a later period in his life. Every page of this little book is full of sidelights and information on an interesting character and the period in which he lived.

DIE UBERLIEFERUNG DER HIPPOKRATISCHEN SCHRIFT ΠΕΡΙ ΑΕΡΩΝ ΥΔΑΤΩΝΤΟΠΩΝ. By Hans Diller, Philologus, Supplementband XXIII, Heft III. Leipzig, Dieterich'sche Verlagsbuchhandlung, 1932.

This book on the Hippocratic treatise On Airs, Waters and Places does not readily lend itself to review.

DAVID RIESMAN.

ANNALS OF MEDICAL HISTORY

Editor: FRANCIS R. PACKARD, M.D., Philadelphia

CONTENTS OF NEW SERIES, VOLUME FOUR, [illegible]

[illegible]

[illegible]

CONTENTS OF NEW SERIES, VOLUME TWO, 1930

[illegible]